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Cooperative Fertilizer Experiments With Cotton, Corn, Sweet Potatoes and Irish Potatoes, 1908-1917

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COOPERATIVE FERTILIZER EXPERIMENTS WITH COTTON, CORN, SWEET POTATOES AND IRISH POTATOES, 1908-1917

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INTRODUCTION

Cooperative fertilizer experiments were begun in 1907 by the Division of Chemistry of the Texas Experiment Station. Only a few experiments were conducted that year, but in subsequent years from 100 to 200 experiments were carried out each year. Bulletin 138, now out of print, contains a report of the successful experiments in 1908, 1909, and 1910. Bulletin 184 contains a detailed report of the experiments with corn in 1911, 1912, 1913, and 1914. This bulletin contains a report of experiments up to 1918. In 1918, the experiments were temporarily discontinued for several reasons.

The cooperative fertilizer experiments have several objects. One object is to secure information as to the kind of fertilizers needed for different types of Texas soils. After a sufficient number of experiments have been conducted on various types of soil, the relation between the soil types and the actual needs of the soil in the field will be traced.

Another object of the experiments is to ascertain the relation between the results of the fertilizer experiments and the chemical composition of the soil. It is a well known fact that fertilizer experiments on one type of soil are not necessarily applicable to the same crop grown on another and different type. Comprehensive experiments on single types are thus, therefore, of limited application in many cases, and should not without careful study be applied to other types of soil. The chemical analysis of the soil and pot experiments with the different soils are being conducted in connection with the cooperative fertilizer experiments, and we shall endeavor to trace the relation between these three lines of study in subsequent publications.

A third object in conducting the cooperative fertilizer experiments is to give the farmers in various sections of the State an opportunity to ascertain for themselves the behavior of their soils with different applications of fertilizers. The results of such experiments are not only of value to the farmer himself, but also to the farmers in his vicinity; and where the experiments are observed and supervised by the county demonstration agents their results become of value to the entire farming community of the county. Agricultural high schools have also conducted some of the experiments.

NATURE AND SIGNIFICANCE OF FERTILIZERS

The subject of fertilizers is discussed in Bulletin 167 of this Station, and what is said there will not be repeated in this bulletin. A few facts pertaining to the subject under discussion will, however, be given.

The object of a fertilizer is to supply plant food to the soil in such forms that plants can take it up. All soils contain plant foods but they do not always contain sufficient quantities, nor contain them in such forms as to be easily consumed. Plants vary in their needs of plant food, and soils vary in their ability to supply it. Plant food, however, is not the only limiting condition of plant growth, moisture relations and physical character being in many cases much more significant. It has been found in our experiments that vegetable matter or humus is badly needed by many Texas soils, and that application of manure has in many cases given better results than any of the combinations of fertilizers. The vegetable matter supplied by the manure not only carries plant food with it, but it also improves the physical character of the soil, enabling it to retain water better, and to hold it more securely against evaporation. As moisture conditions affect the size of the crop grown under Texas conditions very seriously, the aid of the vegetable matter in controlling moisture is of material importance in producing the crop or increasing its size.

Plant food being only one of the controlling conditions of plant growth, it follows that, in order to secure the best results from an application of plant food, it is necessary that the other controlling conditions should be as favorable as possible. This is not always the case. Indeed, a great many experiments were entirely lost by too much moisture or too little moisture, failure to get a stand, or damage by insects, showing the importance of the other controlling conditions.

The adaptation of fertilizers to soils and to plants means the use of such as will supply the necessary food without a deficiency of some needed element, and the consequent decrease in the size of the crop. The three important forms of plant food are phosphoric acid, potash and nitrogen. Our soil analyses show that, as a rule, Texas soils are often deficient in phosphoric acid and nitrogen, and less often deficient in potash. Potash should be used only where it is known to be needed.

Acid phosphate was used in our experiments for the purpose of supplying phosphoric acid. It contained sixteen per cent. available phosphoric acid.

Basic slag was used in a few experiments. Basic slag is a combination of lime and phosphoric acid, secured as a by-product in the manufacture of iron which contains phosphorus. Basic slag also contains some iron.

Cottonseed meal was used in these experiments for the purpose of supplying nitrogen. Cottonseed meal also contains a small amount of potash and phosphoric acid, usually about 6.88 per cent. nitrogen, 1.5 per cent. potash and 2.5 per cent. phosphoric acid. Nitrate of soda was used in one series of experiments on one plot for the purpose of replacing a portion of the cottonseed meal to see if it improved the size of the crop, or was equally as valuable as the cottonseed meal. Sulphate of potash was used in many of the experiments to supply

potash. This contained 50 per cent. potash. Muriate of potash was also used, however.

INTERPRETATION OF FIELD EXPERIMENTS WITH FERTILIZERS

Field experiments require care in their interpretation. Variations in the depth or physical character of the soil, or in fertility of different plots, the attacks of birds or insects, injury by storms, and the situation of the soil with respect to drainage, may influence the plots unequally. It has been shown by experiments that a number of plots on a field apparently of uniform fertility and treated exactly alike, do not produce exactly the same yield, and, further, that these yields are not always in the same direction each year. Differences in the depth or character of the subsoil may be the cause of these variations, giving rise to differences in moisture content, which are not always the same each year.

PLAN OF THE COOPERATIVE FERTILIZER EXPERIMENTS

The general plan of the experiments is shown in the instructions sent out for 1915. The instructions were nearly the same each year, there being, however, some differences in the applications made. These differences are brought out in the tables of results.

The writer desires to express his appreciation of the work of those who have succeeded in carrying out successful experiments and also those whose crops were injured or destroyed. The services that they have rendered will be of advantage to the entire farming community of Texas.

Instructions for cooperative fertilizer experiments.—The following are the instructions sent out:

> Please read these instructions carefully as soon as you receive them. If there is anything you do not understand, or if you desire further information, write us fully.
>
> Please advise us whether or not the fertilizer arrives in time and in good condition. If any bag is torn, please weigh it. Please note carefully any change that may have been made to suit your conditions.
>
> Select a uniform piece of land, either about an acre for corn or cotton, or else about half an acre for truck crops. This is to be divided into ten plots. Each plot must naturally produce the same quantity of cotton or corn or other crops. Any natural difference in the productiveness would appear as due to the fertilizer, whereas it is really due to the soil. So take care to select a piece of land which produces the same amount of crop in all its parts, and which does not contain any rich or poor spots, and no portion of which is subject to more favorable or unfavorable conditions than any other portion.
>
> For corn, cotton or similar crops use an area equivalent to approximately one-tenth acre for each plot or application of fertilizer.

If the rows are four feet apart, use four rows 280 feet long, or eight rows 140 feet long, or sixteen rows 70 feet long.

For potatoes, tomatoes, onions, or similar crops, use an area of land equivalent to one-twentieth acre for each plot or application of fertilizer. If the rows are four feet apart, use two rows 280 feet long, or four rows 140 feet long, or eight rows 70 feet long. If the rows are two feet apart, the number of rows for each application of fertilizer should be double that stated above.

The important point is to have the same number of rows of exactly the same length in each of the ten plots, planted to the same crop.

The application to the different plots are as follows:

Plot No. 1. Apply nothing.

Plot No. 2. Apply bag No. 2, 15 pounds acid phosphate.

Plot No. 3. Apply bag No. 3, twenty pounds cottonseed meal.

Plot No. 4. Apply bag No. 4, 15 pounds acid phosphate, 10 pounds cottonseed meal, 5 pounds nitrate of soda.

Plot No. 5. Apply bag No. 5, 15 pounds acid phosphate, 20 pounds cottonseed meal.

Plot No. 6. Apply bag No. 6, 15 pounds acid phosphate, 20 pounds cottonseed meal, 2 pounds sulphate of potash.

Plot No. 7. Apply bag No. 7, 15 pounds acid phosphate, 20 pounds cottonseed meal, 5 pounds sulphate of potash.

Plot No. 8. Apply nothing.

Plot No. 9. Apply one load of manure.

Plot No. 10. Apply bag No. 10, 15 pounds acid phosphate and one load of manure.

The fertilizer should be well mixed and applied in the drill about a week before the seed is planted. It should not be allowed to come in direct contact with the seed. The entire field should receive the same treatment, and should be planted with the same kind of seed of the same crop. If any of the plots are damaged by storms, insects, or anything else, the fact should be noted and considered. The only difference between the plots should be the quantity of fertilizer. The date of maturity should be stated and the crop from each plot should be harvested and weighed separately.

A report blank will be furnished. Report total weight of ear corn per plot, weight of seed cotton per plot, total weight of potatoes per plot, and weight of those marketable, etc. The stand on each plot should also be noted and reported. Note any difference in size or stalk or appearance of plot. You should retain a copy of the report and of your observations, for your own use.

This experiment should show which of these fertilizers would prove probably most profitable under your conditions, and it would give you an intelligent basis for fertilizing next season.

Information concerning fertilizers is contained in bulletins of the Texas Experiment Station. Any bulletin is free on application. Requests for bulletins should be addressed to the Director of the Experiment Station.

We prefer the fertilizer to be applied by hand, distributing it as evenly as possible. A tin or paper horn reaching nearly to the ground may be used if there is any wind. If necessary, the fertilizer may be applied just before planting, but the plow should run through the furrow to mix it with the soil, or some other method of mixing used. The fertilizer must not come in direct contact with the seed. If the fertilizer does not arrive in time, it may be applied after the seed has been planted, by opening a furrow along the side of the plants, putting in the fertilizer, and dirting back upon it.

GENERAL RESULTS OF THE EXPERIMENTS WITH COTTON.

The details of the experiments with cotton in 1911-1917, inclusive, are presented in subsequent pages. The detailed results are also presented later (tables 25 to 34, inclusive). We also include in the tables the results secured in 1908, 1909, 1910, published in Bulletin 138.

Table 1.—Summary of cotton experiments, 1908-1917.

	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	Total.	Per cent.
Number of experiments....	4	13	5	13	26	23	46	11	7	3	151	100
Number showing gains by acid phosphate.....	2	11	5	9	17	15	37	11	3	2	112	74
Number showing gains by cottonseed meal.....	3	9	3	12	21	16	22	10	4	3	103	68
Number showing gains by potash.....	2	5	3	7	13	13	26	6	2	3	80	53

Table 1 is a summary of the 151 cotton experiments with respect to the response to fertilizer. Where a gain is shown, it means any gain at all, and not necessarily a gain sufficient to pay for the fertilizer.

The table shows that 74 per cent. of the experiments gave a gain with acid phosphate, 68 per cent. a gain with cottonseed meal, and only 53 per cent. a gain with potash. Thus, these soils need phosphoric acid first, nitrogen next, and potash last of all.

Table 2.—Average gain seed cotton, pounds per acre, where a gain occurred.

	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	Average.
By acid phosphate (200 pounds)...	185	160	50	.....	.....	.....	.....	.....	.....	.....	131
By acid phosphate (160 pounds)...	.....	.....	.....	138	.....	.....	.....	.....	.....	.....	138
By acid phosphate (150 pounds)...	.....	.....	.....	.....	113	114	148	144	83	73	113
By cottonseed meal (30 pounds)....	20	105	.....	.....	.....	.....	.....	.....	.....	.....	63
By cottonseed meal (60 pounds)....	.....	.....	40	.....	.....	.....	.....	.....	.....	.....	40
By cottonseed meal (70 pounds)....	.....	.....	.....	121	.....	.....	.....	.....	.....	.....	121
By cottonseed meal (100 pounds)..	40	97	.....	.....	.....	.....	.....	.....	.....	.....	69
By cottonseed meal (120 pounds)..	.....	.....	167	135	.....	.....	.....	.....	.....	.....	151
By cottonseed meal alone (200 pounds).....	.....	.....	.....	.....	200	80	130	133	62	147	125
By cottonseed meal (with acid phosphate) (200 pounds).....	.....	.....	.....	.....	73	109	134	107	127	395	*158
By cottonseed meal (300 pounds)..	.....	.....	.....	.....	140	.....	.....	.....	.....	.....	140
By muriate of potash (5 pounds)..	20	30	140	.....	.....	.....	.....	.....	.....	.....	63
By muriate of potash (12.5 pounds)	55	60	120	40	.....	.....	.....	.....	.....	.....	69
By muriate of potash (20 pounds).	.....	.....	.....	.....	95	58	55	56	90	20	62
By muriate of potash (25 pounds).	.....	.....	.....	115	.....	.....	.....	.....	.....	.....	115
By muriate of potash (50 pounds).	.....	.....	.....	.....	87	63	84	67	.....	.....	75

*With 1917 excluded, 109 pounds.

Table 2 shows the average gain per acre with cotton where a gain occurs. Where there was no gain, the experiment was left out of consideration in the preparation of this table.

From 150 to 200 pounds of acid phosphate produced an average gain of 50 to 185 pounds seed cotton per acre, where a gain occurred, which was 74 per cent. of the experiments as shown in the previous table.

From 30 to 100 pounds cottonseed meal produced 20 to 105 pounds seed cotton increase. Two hundred pounds cottonseed meal alone, or with phosphates, produced 62 to 200 pounds seed cotton increase. Three hundred pounds, used only one year, however, gave no increase over 200 pounds. These gains refer only to cases in which gains occurred, about 68 per cent. of the experiments.

From 5 to 25 pounds of muriate of potash produced gains of 20 to 140 pounds seed cotton. Fifty pounds of muriate of potash gave gains of 63 to 87 pounds. These gains occurred only, as pointed out previously, in 53 per cent. of the experiments.

DETAILED RESULTS OF THE EXPERIMENTS WITH COTTON.

In this section we shall discuss the effect of the various fertilizing ingredients and mixtures in more detail.

Acid phosphate alone.—Acid phosphate alone, giving results in 74 per cent. of the experiments and increases of from 50 to 185 pounds seed cotton where a gain occurs, seems to be, on the average, the most profitable and the most certain of the commercial fertilizers for cotton. It is estimated that 100 pounds seed cotton requires 2.5 pounds phosphoric acid for growth of the cotton plant and the accompanying stalk and leaves. One hundred pounds of 16 per cent. of phosphoric acid supplies 16 pounds of available phosphoric acid, and it is assumed that if only one-half is utilized by the crop, it would be sufficient for 300 pounds seed cotton. The average increase in the experiments was from 113 to 138 pounds. Thus, 100 pounds acid phosphate would supply twice the amount necessary for the gain secured. From 60 to 100 pounds acid phosphate per acre should, therefore, be sufficient to produce the increases usually secured in these experiments, and from these experiments this amount appears to be the best to be used when applied alone. When applied in addition to other fertilizer, however, the quantity used should be sufficient for the entire increase. If we assume that one-half of the phosphoric acid is used by the crop, the amount needed would be approximately 5 pounds phosphoric acid per 100 pounds seed cotton. One hundred pounds of 16 per cent. acid phosphate would thus be sufficient to take care of 300 pounds seed cotton increase over the quantity that could be secured with no fertilizer at all. These considerations assume that the phosphoric acid is needed by the entire plant. If needed only to produce seed and lint, the crop produced could be much larger.

Although acid phosphate alone gives the best results, it does not follow that acid phosphate should be used exclusively. If acid phosphate is used exclusively on cotton, corn, or similar crops, and no

legumes turned under or grazed off and no barnyard manure added, the soil will become depleted in nitrogen. In greater or less time, depending upon the quantity of nitrogen in the soil, the soil will become deficient in nitrogen, and the increase due to the acid phosphate will fall off. In fact, this falling off may take place rapidly. On the other hand, if nitrogen is secured from the air by a suitable rotation, including legumes to be turned under or grazed off, the use of acid phosphate alone may be sufficient to give good results for a long time.

The plots receiving acid phosphate alone as a rule suffered least during dry weather. The yields were time and again cut short by drouth, and the plots receiving nitrogen and potash as a rule suffered more decidedly than those receiving acid phosphate alone.

Cottonseed meal.—Quantities of cottonseed meal of less than 100 pounds produced from 20 to 121 pounds seed cotton increase, the average being 70 pounds. One hundred pounds seed cotton requires approximately 6.5 pounds nitrogen for the seed and the accompanying stalk and leaves. One hundred pounds of cottonseed meal contains approximately 6.7 pounds nitrogen, or sufficient nitrogen for 100 pounds seed cotton. The nitrogen, where it gave a gain, was well utilized, the utilization being nearly all of the nitrogen. One pound of cottonseed meal on the basis just stated should produce one pound of seed cotton.

Two pounds of cottonseed meal produced, where a gain was produced, from 62 to 395 pounds seed cotton increase, or about 115 pounds, on an average. Two hundred pounds would contain 13.4 pounds nitrogen, sufficient for 200 pounds seed cotton; 60 per cent. of the nitrogen would be utilized on this basis. This is also a good utilization. Three hundred pounds cottonseed meal, which was used only one year, gave no more cotton than 200 pounds. From one to 200 pounds cottonseed meal, therefore, seems to be the best quantity to use under Texas conditions. The gains mentioned, as already stated, were secured in 68 per cent. of the experiments.

Although cottonseed meal gave the average gains indicated above, there were a number of results in which the mixture of acid phosphate and cottonseed meal gave little better results than acid phosphate alone.

The plots receiving cottonseed meal alone, or in combination, suffered more from drouth than the other plots. In a number of the experiments the cottonseed meal plots did much better than the others at first, and a larger yield was indicated, but a dry period cut short the development of lint and injured the yield decidedly. We ascribe this to the larger development of foliage caused by the cottonseed meal. This resulted in an increase in the requirements for moisture, so that the plant suffered more quickly and to a greater extent during the period. Cotton withstands dry weather much better than corn.

Cottonseed meal and acid phosphate.—As already stated, cottonseed meal and acid phosphate did not, on the average, produce as profitable results as either one alone, but the results are, on the average, profitable.

There are a number of individual cases in which the mixture is more profitable than the acid phosphate alone, or the cottonseed meal alone. The point we wish to emphasize here is that the individual farmer must study his soil conditions and use the fertilizer which is best suited to his individual conditions and the requirements of his soil.

What fertilizer to use.—These experiments suggest for general use a fertilizer composed of one part acid phosphate and two parts cottonseed meal or equal parts acid phosphate and cottonseed meal at the rate of 150 to 200 pounds per acre. A mixture of two parts cottonseed meal to one part acid phosphate will give good results on many soils, but should be used only experimentally at first. If a mixed fertilizer is used, we would suggest one containing about 8 per cent. available phosphoric acid and about 3.5 per cent. nitrogen at the rate of 150 to 200 pounds per acre. If larger quantities are to be used, we suggest one containing 5 per cent. available phosphoric acid and 4 per cent. nitrogen at the rate of 250 to 300 pounds per acre.

Twelve and one-half pounds muriate of potash produced 40 to 100 pounds seed cotton, with an average of 69 pounds, while 20 pounds produced 20 to 95 pounds, with an average of 62 pounds. Fifty pounds produced 63 to 87 pounds seed cotton, with an average of 75 pounds. The larger application thus produced no better results than the smaller one. One hundred pounds of seed cotton requires for the seed, leaves, stalk, etc., approximately 4.3 pounds potash. Twelve and one-half pounds muriate of potash contain approximately 6.5 pounds potash, and, if entirely utilized, would thus produce 150 pounds seed cotton. This assumes that the potash is used for the entire plant. The potash in the 12.5 pounds muriate of potash is thus utilized to the extent of about 50 per cent.

Table 3.—Average results of experiments, pounds of seed cotton per acre, 1908-1910.

The application and its analysis.	1908	1909	1910
Number averaged	4	13	5
No fertilizer	580	405	634
200 pounds acid phosphate	648	478	621
200 pounds acid phosphate and 30 pounds cottonseed meal (14% phosphoric acid and 0.9% nitrogen)	625	614	.....
200 pounds acid phosphate and 100 pounds cottonseed meal (1.07% phosphoric acid, 2.3% nitrogen)	680	582	.....
200 pounds acid phosphate, 30 pounds cottonseed meal and 5 pounds muriate of potash (14% phosphoric acid, 0.9% nitrogen and 1.1% potash)	675	556	.....
200 pounds acid phosphate, 30 pounds cottonseed meal, 12.5 pounds muriate of potash (13% phosphoric acid, 0.9% nitrogen, 2.5% potash)	703	555	.....
200 pounds acid phosphate, 60 pounds cottonseed meal (12.3% phosphoric acid, 1.6% nitrogen)	.....	.....	702
200 pounds acid phosphate, 120 pounds cottonseed meal (10% phosphoric acid 2.6% nitrogen)	.....	.....	742
200 pounds acid phosphate, 60 pounds cottonseed meal, 5 pounds muriate of potash (12.2% phosphoric acid, 1.6% nitrogen, 0.9% potash)	.....	.....	763
200 pounds acid phosphate, 60 pounds cottonseed meal, 12.5 pounds muriate of potash (11.7% phosphoric acid, 1.5% nitrogen, .22% potash)	.....	.....	744

In tables 3 and 4, we find that 12.5 pounds muriate of potash produced 23 pounds seed cotton as an average of 1908-09-10, and that 20 pounds muriate of potash produced an average of 8 pounds seed cotton in 1911-17, inclusive.

The general use of potash in mixed fertilizers for cotton is thus, we should judge, not profitable. Potash should be used only when the farmer is satisfied that his soil needs it, and then in such quantities that it will be of benefit. We, therefore, advise against the general use of the ordinary complete fertilizer for cotton, containing 8 per cent. available phosphoric acid, 2 per cent. nitrogen and 2 per cent. potash.

In this connection, we must observe that potash is more abundant in the soil than either phosphoric acid or nitrogen, and is often present in very large quantities.

Table 4.—Average results of experiments, pounds seed cotton per acre, 1911-1917.

The application and its analysis.	1911	1912	1913	1914	1915	1916	1917
Number averaged	13	26	22	45	11	7	3
No fertilizer	592	735	518	673	540	670 (761)	283 (367)
150 pounds acid phosphate (16% phosphoric acid)	695	796	609	798	725	713	360
150 pounds acid phosphate, 70 pounds cottonseed meal (12.4% phosphoric acid, 2.0% nitrogen)	851	.....	.....	.....	.....	.....	.....
160 pounds acid phosphate, 140 pounds cottonseed meal (8.4% phosphoric acid, 2.8% nitrogen, 1.0% potash)	805	.....	.....	.....	.....	.....	.....
150 pounds acid phosphate, 300 pounds cottonseed meal (6.0% phosphoric acid, 4.7% nitrogen, 1.5% potash)	.....	899	.....	.....	.....	.....	.....
150 pounds acid phosphate, 200 pounds cottonseed meal (6.4% phosphoric acid, 4.0% nitrogen, 1% potash)	.....	902	641	854	802	813	620
200 pounds cottonseed meal (7.0% nitrogen)	.....	829	613	770	696	736	434
160 pounds acid phosphate, 140 pounds cottonseed meal, 12.5 pounds muriate of potash (9.0% phosphoric acid, 3.3% nitrogen, 2.7% potash)	765	.....	.....	.....	.....	.....	.....
150 pounds acid phosphate, 200 pounds cottonseed meal, 20 pounds muriate of potash (6.2% phosphoric acid, 3.9% nitrogen, 3.5% potash)	.....	837	644	843	793	821	643
160 pounds acid phosphate, 140 pounds cottonseed meal, 25 pounds muriate of potash (8.2% phosphoric acid, 3.0% nitrogen, 4.6% potash)	838	.....	.....	.....	.....	.....	.....
150 pounds acid phosphate, 200 pounds cottonseed meal, 50 pounds muriate of potash. (5.7% phosphoric acid, 3.5% nitrogen, 7% potash	.....	901	620	885	797	.....	.....
150 pounds acid phosphate, 100 pounds cottonseed meal, 50 pounds nitrate of soda (7.6% phosphoric acid, 4.7% nitrogen)	.....	.....	657	812	747	789	617

Barnyard manure.—Barnyard manure gave larger gains than acid phosphate, cottonseed meal, or potash salts. The manure was applied at the rate of ten loads per acre. The average gain due to manure where a gain occurred, was from 107 to 227 pounds seed cotton.

Barnyard manure contains all three forms of plant food, phosphoric acid, potash, and nitrogen. The nitrogen is usually in excess, so that an addition of acid phosphate is also advisable. Manure contains about 0.5 per cent. nitrogen, 0.3 per cent. phosphoric acid, and 0.5 per cent. potash, though it varies greatly.

Table 5.—Average pounds seed cotton produced by manure.

Year.	No fertilizer.	Manure.	Gain.	Number of experiments.
1911	615	810	195	6
1912	753	980	227	22
1913	513	620	107	19
1914	680	853	173	43
1915	561	773	212	10
1916	696	861	165	7
1917	325	507	182	3
Average	592	772	180	

The beneficial action of barnyard manure, however, is not due solely to the plant food it contains. The vegetable matter in manure is beneficial for several reasons. It lightens up heavy soils and makes loose soils more retentive of moisture. It aids the moisture to penetrate into the soil and aids the soil to retain the moisture. It makes the soil respond better to operations of tillage. In general, manure improves the physical character of the soil and its ability to supply the plant with moisture.

The effects of manure extend beyond the year of its application. In some experiments the results of heavy applications of manure have increased the size of the crop for twenty years after the application of manure was discontinued.

Manure loses value rapidly when exposed to rain.

Farmers should make every effort to save manure, and to use all waste vegetable matter for improving the soil. Manure from cattle pens is valuable and should be saved.

In the absence of sufficient manure, legumes may be grown to supply the necessary vegetable matter to the soil and to secure nitrogen from the air. The crop should either be turned under or grazed off; it should not be made into hay.

Thomas phosphate.—Thomas phosphate is a by-product in the manufacture of steel from iron containing much phosphorus. The phosphoric acid is available to a certain extent, especially in acid soils, but it is not so quickly available as the phosphoric acid of acid phosphate. Only four tests were made with Thomas phosphate in 1910 and 1912, not sufficient to draw conclusions from.

Rock phosphate.—Finely ground phosphate rock was used in sixteen experiments in 1912 at the rate of 200 pounds per acre, compared with 150 pounds acid phosphate. The average results are shown in table 6.

The 200 pounds of rock phosphate contained approximately 60 pounds of phosphoric acid, whereas the 150 pounds of acid phosphate contained approximately 24 pounds of available phosphoric acid. Ten pounds of phosphoric acid in rock phosphate produced 3 pounds of seed cotton; 10 pounds of available phosphoric acid in acid prosphate produced 13 pounds of seed cotton on an average. The phosphoric acid of the rock phosphate thus had about 22 per cent. of the effect of the phosphoric acid of acid phosphate. These are the average results. The bulk of the phosphoric acid in the rock phosphate remains in the soil and may be used for subsequent crops.

Table 6.—Effect of rock phosphate on seed cotton, pounds per acre.

Number of tests	16
No fertilizer	714
Acid phosphate	745
Rock phosphate	731
Gain due to acid phosphate	31
Gain due to rock phosphate	17

The rock phosphate was used alone, and not in combination with manure, as has been recommended by several writers.

Lime.—Hydrated lime at the rate of 400 pounds per acre was used in 20 experiments in 1913. With no fertilizer and no lime 538 pounds seed cotton were produced, on an average; with lime, 505 pounds, thus giving a loss of 33 pounds per acre for the lime. In 1911, 1000 pounds carbonate of lime per acre produced 592 pounds seed cotton, while no lime produced 643 pounds.

Nitrate of soda compared with cottonseed meal.—In 1913 to 1917 tests were run in which 50 pounds nitrate of soda was substituted for 100 pounds cottonseed meal. The average results are given in table 7. Cottonseed meal on an average gives slightly better results than the mixture.

Table 7.—Yield of seed cotton per acre with nitrate of soda and with cottonseed meal.

	1913	1914	1915	1916	1917
Number of tests	22	44	11	7	3
With 150 pounds acid phosphate, 100 pounds cottonseed meal, 50 pounds nitrate of soda	613	812	747	789	617
With 150 pounds acid phosphate, 200 pounds cottonseed meal	657	848	802	813	620

Mixed fertilizers.—Tables 2 and 3 show the composition of the mixed fertilizers used in these experiments and the average results secured. In many cases the mixed fertilizers were not profitable, and this is still more evident if they be compared with the acid phosphate alone.

RESULTS OF THE EXPERIMENTS WITH CORN.

Experiments with corn, 1908-14, are published in Bulletin 184 of this Station. They are also discussed fully in that bulletin. Although 39 additional experiments are presented in the bulletin, they do not change the conclusions given in the previous bulletin. There is no need, therefore, to enter into a detailed discussion of these results.

Table 8.—Summary of corn experiments, 1908-1917.

	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	Total.	Per cent.
Number of experiments—total	3	13	21	8	19	18	32	28	7	4	153	.....
Number showing gain by acid phosphate	3	13	15	8	13	14	20	16	5	0	107	70
Number showing gain by cottonseed meal	1	5	11	7	15	14	23	18	5	2	101	66
Number showing gain by potash	.....	4	8	3	6	11	14	16	3	0	65	42

Table 8 is a summary of the corn experiments of 1908-17. Table 9 shows the average gain per acre where a gain occurs. Table 10 gives the average results of the various applications, 1908-17.

Table 9.—Average gain corn, bushels per acre, where a gain occurred.

	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917
By acid phosphate (200 pounds)	6.3	6.2	5.6	.....	.....	.....	.....	.....	.....	.....
By acid phosphate (160 pounds)	.....	.....	.....	5.0	.....	.....	.....	.....	.....	.....
By acid phosphate (150 pounds)	.....	.....	.....	.....	7.0	6.2	6.7	2.9	3.7	0
By cottonseed meal (30 pounds)	0.4	6.6	.....	.....	.....	.....	.....	.....	.....	.....
By cottonseed meal (60 pounds)	.....	.....	2.7	.....	.....	.....	.....	.....	.....	.....
By cottonseed meal (70 pounds)	.....	.....	.....	3.8	.....	.....	.....	.....	.....	.....
By cottonseed meal (100 pounds)	1.1	3.4	.....	.....	.....	.....	.....	.....	.....	.....
By cottonseed meal (120 pounds)	.....	.....	9.2	.....	.....	.....	.....	.....	.....	.....
By cottonseed meal (alone) (200 pounds)	.....	.....	.....	.....	6.5	6.1	6.6	4.2	3.6	3.2
By cottonseed meal (with acid phosphate) (200 pounds)	.....	.....	.....	.....	7.1	6.0	5.5	4.3	2.4	0
By cottonseed meal (300 pounds)	.....	.....	.....	.....	5.9	.....	.....	.....	.....	.....
By muriate of potash (5 pounds)	.....	2.9	7.6	.....	.....	.....	.....	.....	.....	.....
By muriate of potash (12.5 pounds)	.....	2.4	10.1	3.2	.....	.....	.....	.....	.....	.....
By muriate of potash (20 pounds)	.....	.....	.....	.....	2.4	2.4	2.3	2.1	2.7	0
By muriate of potash (25 pounds)	.....	.....	.....	2.3	.....	.....	.....	.....	.....	.....
By muriate of potash (50 pounds)	.....	.....	.....	.....	2.1	4.1	5.1	3.7	0.5	0
By 10 loads manure	.....	.....	.....	8.9	11.7	10.5	8.3	.....	.....	.....

Acid phosphate alone appears to be the most profitable and most certain of the fertilizers for corn. From 70 to 100 pounds acid phosphate alone should be sufficient to produce gains of from 5 to 9 bushels of corn. Unless a rotation of crops including legumes to be turned under or grazed off is practiced, or nitrogen applied in some other way, land fertilized with acid phosphate alone will lose nitrogen and decrease in fertility.

Table 10.—Average results of corn experiments, 1911-1917.

The application and its analysis.	1911	1912	1913	1914	1915	1916	1917
Number averaged	8	18	18	32	28	7	4
No fertilizer	19.9	23.5	19.6	14.3	20.9	18.4	13.8
150 or 160 pounds acid phosphate (16% phosphoric acid)	24.2	27.6	23.0	19.1	21.8	20.5	13.6
160 pounds acid phosphate, 70 pounds cottonseed meal (12.4% phosphoric acid, 2.0% nitrogen)	27.4	.....	.....	.....	.....	.....	.....
160 pounds acid phosphate, 140 pounds cottonseed meal (8.4% phosphoric acid, 2.8% nitrogen, 1.0% potash)	27.9	.....	.....	.....	.....	.....	.....
150 pounds acid phosphate, 300 pounds cottonseed meal (6.0% phosphoric acid, 4.7% nitrogen, 1.5% potash)	.....	29.4	.....	.....	.....	.....	.....
150 pounds acid phosphate, 200 pounds cottonseed meal (6.4% phosphoric acid, 4.0% nitrogen, 1% potash)	.....	29.6	24.9	20.6	24 2	22.6	16.8
200 pounds cottonseed meal (7.0% potash)	.....	27.7	23.1	18.0	23.0	15.5	17.3
160 pounds acid phosphate, 140 pounds cottonseed meal, 12.5 pounds muriate of potash (9.0% phosphoric acid, 3.3% nitrogen, 2.7% potash)	*22.4	.....	.....	.....	.....	.....	.....
150 pounds acid phosphate, 200 pounds cottonseed meal, 20 pounds muriate of potash (6.2% phosphoric acid, 3.9% nitrogen, 3.5% potash)	.....	29.6	25.3	21.4	24.9	23.5	15.3
160 pounds acid phosphate, 140 pounds cottonseed meal, 25 pounds muriate of potash (8.2% phosphoric acid, 3.0% nitrogen, 4.6% potash)	†29.0	.....	.....	.....	.....	.....	.....
150 pounds acid phosphate, 20 pounds cottonseed meal, 50 pounds muriate of potash (5.7% phosphoric acid, 3.5% nitrogen, 7% potash)	.....	‡30.0	26.7	22.7	25.9	23.7	.....
150 pounds acid phosphate, 100 pounds cottonseed meal, 50 pounds nitrate of soda (7.6% phosphoric acid, 4.7% nitrogen)	.....	.....	24.6	19.4	25.4	22.7	17.4

*Compare with 21.5; †compare with 29.5; ‡compare with 28.7

The general use of potash in mixed fertilizers for corn is unprofitable, and potash should be used only when the soil is known to need it.

A fertilizer composed of equal parts of acid phosphate and cottonseed meal, or one containing about 8 per cent. available phosphoric acid and 3.5 per cent. nitrogen appears to be a good fertilizer for corn on Texas soils.

RESULTS OF THE EXPERIMENTS WITH IRISH POTATOES.

Details of the experiments for 1909-1910 are published in Bulletin 138.

A summary of the experiments is given in table 11. Of the 54 experiments, 39 tests, or 72 per cent., gave results with acid phosphate, 47 tests, or 87 per cent. gave results with cottonseed meal, and 28 tests, or 52 per cent., gave results with potash.

Table 11.—Summary of Irish potato experiments, 1908-1917.

	1909	1910	1911	1912	1913	1914	1916	1917	Total.	Per cent.
Number of experiments—total	6	7	12	9	11	4	3	2	54	100
Number showing gain by acid phosphate	4	6	9	4	9	4	2	1	39	72
Number showing gain by cottonseed meal	6	7	10	5	10	4	3	2	47	87
Number showing gain by potash	3	2	7	5	6	1	2	2	28	52

Irish potatoes respond better to nitrogen than do corn or cotton. Table 12 shows the average gains, where such occur.

The average gain caused by 300 pounds acid phosphate, where a gain occurs, is from 10 to 24 bushels per acre.

Table 12.—Average gain Irish potatoes, bushels per acre, where a gain occurred.

	1909	1910	1911	1912	1913	1914	1916	1917
By acid phosphate (300 pounds)	19	10	13	24	15	15	22	2
By cottonseed meal (alone) (400 pounds)	.....	.....	.....	28	17	22	18	25
By cottonseed meal (with acid phosphate) (400 pounds)	24	15	24	16	17	13	22	43
By cottonseed meal (600 pounds)	.....	.....	.....	30	.....	.....	.....	.....
By muriate of potash (20 pounds)	6	10	8	.....	.....	.....	.....	.....
By muriate of potash (40 pounds)	.....	.....	.....	8	6	5	12	7
By muriate of potash (100 pounds)	7	14	15	10	8	.....	.....	.....

The average gain caused by 400 pounds cottonseed meal alone, where a gain occurs, is from 18 to 28 bushels.

The average gain caused by 400 pounds cottonseed meal, where acid phosphate is used, where a gain occurs, is from 13 to 24 bushels per acre.

The gain from 20 pounds of sulphate of potash per acre, where a gain occurs, is from 6 to 10 bushels; from 40 pounds muriate, it is 6 to 12 bushels; from 100 pounds muriate, it is 7 to 15 bushels. Twenty pounds of muriate of potash give as good gains as 40 or 100 pounds.

It is estimated that one bushel of Irish potatoes requires 0.10 pounds of phosphoric acid, and 0.22 pounds nitrogen and 0.3 pounds of potash. Assuming a utilization of 50 per cent. of the plant food, 100 pounds of 16 per cent. acid phosphate would contain enough phosphoric acid for nearly 80 bushels of potatoes; 100 pounds cottonseed meal would contain 6.88 pounds nitrogen, sufficient for 15 bushels of potatoes; 100 pounds muriate of potash would contain 50 pounds of potash, sufficient for 85 bushels of potatoes.

Table 13.—Average results of Irish potato experiments, bushels per acre—1911-1917.

The application and its analysis.	1909	1910	1911	1912	1913	1914	1916	1917
Number averaged	6	7	12	9	11	4	3	2
No fertilizer	36.7	25.0	52.5	44.5	29.7	30.5	39	74
300 pounds acid phosphate (16% phosphoric acid)	50.3	31.5	58.1	56.0	44.1	46.0	61	75
300 pounds acid phosphate, 600 pounds cottonseed meal (6.0% phosphoric acid, 4.7% nitrogen, 1.5% potash)	.....	.....	.....	70.7	.....	.....	.....	.....
300 pounds acid phosphate, 400 pounds cottonseed meal (6.4% phosphoric acid, 4.0% nitrogen, 1% potash)	70.2	46.4	76.1	67.4	54.6	63	76	120
400 pounds cottonseed meal (7.0% nitrogen)	.....	.....	.....	56.1	45.9	53	57	99
300 pounds acid phosphate, 400 pounds cottonseed meal, 20 pounds muriate of potash (7.5% phosphoric acid, 3.9% nitrogen, 2.2% potash)	72.2	48.4	73.9	.....	.....	.....	.....	.....
300 pounds acid phosphate, 400 pounds cottonseed meal, 40 pounds muriate of potash (6.2% phosphoric acid, 3.9% nitrogen, 35% potash)	.....	.....	.....	69.7	55.5	60	86	127
300 pounds acid phosphate, 400 pounds cottonseed meal, 100 pounds muriate of potash (5.7% phosphoric acid, 3.5% nitrogen, 7% potash)	50.3	50.8	83.6	65.2	56.1	58	.....	.....
300 pounds acid phosphate, 200 pounds cottonseed meal, 100 pounds nitrate of soda (7.6% phosphoric acid, 4.7% nitrogen)	.....	.....	.....	.....	53.5	72	74	117

The utilization of the plant food in these tests was very low or, to put it another way, much smaller applications of plant food should have secured the same average results. The results indicate that an application of 100 pounds acid phosphate with 200 pounds cottonseed meal would be sufficient for the average increase. Where potash is needed, 20 pounds of muriate of potash appears sufficient for the average increase that may be produced. The non-potassic potato fertilizer would thus contain 5 per cent. available phosphoric acid and 4.5 per cent. nitrogen, while the potassic potato fertilizer would contain 5 per cent. available phosphoric acid, 4.5 per cent. nitrogen and 3 per cent. potash. Applications of 300 pounds per acre would be advisable. Larger applications can, of course, be used where the crop possibility is greater. Larger applications of potash may be advisable where the soil is known to be deficient in potash, but unless such is known to be the fact larger quantities of potash should not be used. Three hundred pounds of this fertilizer, if one-half the plant food is used, would supply enough phosphoric acid for 75 bushels potatoes; enough nitrogen for 60 bushels, and enough potash for 15 bushels. The application of fertilizer should depend upon the nature of the soil also; this we will discuss in a subsequent bulletin.

Barnyard manure.—Average results with barnyard manure, 20 loads per acre, are shown in table 14. The average for the first two years is from 3.9 to 4.5 bushels per acre, while the last four years it is from 31 to 38 bushels per acre. These are very striking results, especially when one recalls the fact that manure is lasting in its effects, the results being good for several years.

Table 14.—Average bushels Irish potatoes produced by manure.

Year.	No fertilizer.	Manure.	Gain.	No. of experiments.
1911	58.0	62.5	4.5	5
1912	44.1	48.0	3.9	8
1913	27.0	58.2	31.2	10
1914	31.0	66.0	35.0	4
1916	39.0	72.0	33.0	3
1917	75.0	113.0	38.0	2

Thomas phosphate.—In three experiments with Thomas phosphate in 1912, and one in 1913, the Thomas phosphate was inferior to the acid phosphate in three, and perhaps better in one.

Rock phosphate.—Rock phosphate in four tests in 1912 gave poor results.

Hydrated lime.—Hydrated lime at the rate of 800 pounds per acre gave poor results in two tests, and good results in three tests in 1913.

Nitrate of soda compared with cottonseed meal.—In the tests in which half the cottonseed meal (200 pounds) was replaced by 100 pounds nitrate of soda, in 1913, 1914, 1916 and 1917, the nitrate of soda gave practically the same results as the cottonseed meal. (See table 13.)

RESULTS OF THE EXPERIMENTS WITH SWEET POTATOES.

A summary of the experiments is given in table 15. Of the 23 tests, 15, or 65 per cent., show gains with acid phosphate or cottonseed meal, and 13, or 56 per cent., show gains with potash. The average gain, where a gain occurs, for 300 pounds of acid phosphate is from 19 to 71 bushels per acre, for 400 pounds of cottonseed meal from 8 to 47 bushels, and for 40 pounds muriate of potash from 15 to 60 bushels. (See table 16.) For 100 pounds of muriate of potash, it is 11 to 99 bushels, where a gain occurs. Sweet potatoes respond to the use of potash better than corn or cotton.

Table 15.—Summary of sweet potato experiments, 1908-1917.

	1911	1912	1913	1914	1915	1917	Total.	Per cent.
Number of experiments—total	8	2	5	3	3	2	23	100
Number showing gain by acid phosphate	5	2	2	2	3	1	15	65
Number showing gain by cottonseed meal	4	2	3	2	2	2	15	65
Number showing gain by potash	4	1	3	2	2	1	13	56

It is estimated that one bushel of sweet potatoes requires .06 pound phosphoric acid, 14 pounds of nitrogen and 0.28 pound of potash. These figures are tentative and subject to change. Assuming a utilization of 50 per cent. of the plant food, 100 pounds of 16 per cent. acid phosphate would contain enough phosphoric acid for 133 bushels of sweet potatoes; 100 pounds of cottonseed meal would contain enough nitrogen for 25 bushels sweet potatoes; 100 pounds of muriate of potash would contain enough potash for 180 bushels. The utilization of the

fertilizer plant food in the gains actually secured is low; that is, much smaller amounts of fertilizer than was actually applied should have produced the desired gains.

Table 16.—Average gain sweet potatoes, bushels per acre, where gain occurred.

	1911	1912	1913	1914	1915	1917
By acid phosphate (300 pounds)	71	58	21	19	54	2
By cottonseed meal (alone) 400 pounds)	.....	40	33	8	47	5
By cottonseed meal (with acid phosphate) (400 pounds)	33	30	44	37	70	10
By muriate of potash (40 pounds)	60	29	30	15	49	5
By muriate of potash (100 pounds)	59	11	93	25	99	.....

A mixture of 100 pounds acid phosphate and 200 pounds cottonseed meal would then supply sufficient phosphoric acid for about 137 bushels and enough nitrogen for 50 bushels, assuming a utilization of only half the plant food. This fertilizer would contain 5 per cent. available phosphoric acid and 4.5 per cent. nitrogen. Potash will apparently give profitable results on some soils, in which case we suggest a fertilizer containing 5 per cent. available phosphoric acid, 4.5 per cent. nitrogen and 3 per cent. potash at the rate of 300 pounds per acre. This would supply enough potash for 30 bushels increase in potash if all the potash is used up. It is probable that larger quantities of potash will be profitable for sweet potatoes on some soils.

Table 17.—Average results of sweet potato experiments, 1911-1917.

The application and its analysis.	1911	1912	1913	1914	1915	1917
Number averaged	8	2	5	3	3	2
No fertilizer	.....	42.5	169.7	179.8	188.3	24.6
300 pounds acid phosphate (16% phosphoric acid)	.....	180.0	149.1	188.3	232.6	25.7
300 pounds acid phosphate, 400 pounds cottonseed meal (6.4% phosphoric acid, 4.0% nitrogen, 1% potash)	.....	130.5	180.2	183.0	279.1	30.5
400 pounds cottonseed meal (7.0% nitrogen)	.....	162.7	161.4	200.4	225.9	31.4
300 pounds acid phosphate, 400 pounds cottonseed meal, 40 pounds muriate of potash (6.2% phosphoric acid, 3.9% nitrogen, 3.5% potash)	.....	125.0	189.9	199.6	305.5	39.3
300 pounds acid phosphate, 40 pounds cotton seed meal, 100p ounds muriate of potash (5.7% phosphoric acid 3.5% nitrogen, 7% potash)	.....	115.9	234.6	208.0	345.6	.....
300 pounds acid phosphate, 200 pounds cottonseed meal, 100 pounds nitrate of soda (7.6% phosphoric acid, 4.7% nitrogen)	.....	.....	147.7	193.6	274.3	33.2

Table 17 shows the average results with the various applications.

MISCELLANEOUS EXPERIMENTS.

Experiments with tomatoes, peanuts, onions, cabbage and kafir fodder, are presented in tables 18 to 24. These experiments are very interesting and valuable, but the number is not sufficient to furnish definite conclusions.

INDEX TO EXPERIMENTS BY COUNTIES.

For experiments 200 to 316, see Bulletin 184.

DETAILS OF THE EXPERIMENTS.

The details of the experiments not already published are here given. The experiments are numbered for purposes of reference.

DETAILS OF MISCELLANEOUS EXPERIMENTS.

F. M. Deaver, Rockport, Aransas County. Experiment 316. Farm three and one-half miles southwest of Rockport. Soil poor, but uniform. Produces one-fifth bale of cotton. In cultivation one year after a rest of six years. Previously trucked for several years, then abandoned. Land some twelve feet elevation. Fine light, spotted, sandy soil with a yellowish gray clay subsoil. Drainage not extra good. Breaks land by December 1. Tomatoes planted March 15, harvested May 23 to July 17, fertilizer applied by hand in rows. Two rows per plot three and one-half feet apart and 315 feet long. Cultivated three times with a five-plow cultivator. Plot 1 followed after a growth of cowpeas the year before and showed more early growth. Plot 8 made slow and scant growth. Plot 9 had darker green color and had largest percentage of fruit. Plot 10 had least rotten fruit.

Table 18.—Experiment 316—pounds tomatoes per acre, 1913, Aransas county—F. M. Deaver.

Plot No.	Application.	Pounds.
1	Nothing	5830
2	300 pounds acid phosphate	7050
3	400 pounds cottonseed meal	9960
4	300 pounds acid phosphate, 200 pounds cottonseed meal, 100 pounds nitrate of soda	9480
5	700 pounds acid phosphate, 400 pounds cottonseed meal	8840
6	300 pounds acid phosphate, 400 pounds cottonseed meal, 40 pounds sulphate of potash	10910
7	300 pounds acid phosphate, 400 pounds cottonseed meal, 100 pounds sulphate of potash	9130
8	Nothing	5740
9	One load of manure	70890
10	Hydrated lime, 800 pounds	7920

C. P. Polk & Son, Alvin, Brazoria County. Experiment 317. Farm three miles northwest of Alvin. Soil is moderate, regular and of even depth, best suited to slow growing crops. Has been in cultivation fifteen years. Average yield per acre, twenty bushels of corn. Soil has been neglected and poorly used until three years ago. Surface soil light colored sand. Subsoil clay. Excellent drainage conditions. Land broken in January, tomatoes planted March 27 to April 6 and harvested June 1 to July 1. Fertilizer distributed by hand ten days before planting. Two rows per plot, four feet apart and 280 feet long. Plots 5, 6, 7, 8, 9, 10 were pounded and mulched, others were not. All plots affected by drouth.

Table 19.—Pounds tomatoes per acre, 1914.

Plot No.	Application.	C. P. Polk, Brazoria Co. Experiment 317.	J. G. Gilter, Calhoun Co. Experiment 318.
1	Nothing	3000	2620
2	300 pounds acid phosphate	5360	6860
3	400 pounds cottonseed meal	3920	5560
4	300 pounds acid phosphate, 200 pounds cottonseed meal, 100 pounds nitrate of soda	4320	6420
5	300 pounds acid phosphate, 400 pounds cottonseed meal	4600	5520
6	300 pounds acid phosphate, 400 pounds cottonseed meal, 40 pounds sulphate of potash	4740	6000
7	300 pounds acid phosphate, 400 pounds cottonseed meal, 100 pounds sulphate of potash	5060	6560
8	Nothing	3180	4400
9	20 loads manure	5460	5700
10	Bag No. 10, 300 pounds acid phosphate, 20 loads manure	5480	6300

John G. Gilter, Seadrift, Calhoun County. Experiment 318. One and one-fourth miles east of Seadrift. Soil moderate and uniform. Land has been broken two years. Upland with dark sandy surface soil about eight inches deep with a clay subsoil. Fair drainage conditions. Land broken in November. Tomatoes planted on March 20 and harvested during June and July. Fertilizer applied by hand in furrow and bedded. All plots cultivated alike. Plots 9 and 10 looked best until dry weather. Plots 1 and 8 improved after wet spell. Two rows per plot, four feet apart, and 280 feet long.

Table 20.—Pounds onions per plot, 1912, W. A. Cone, Webb county, experiment 319.

Nothing	2300
70 pounds acid phosphate	2150
140 pounds cottonseed meal	2100
70 pounds acid phosphate, 140 pounds cottonseed meal	2350
70 pounds acid phosphate, 140 pounds cottonseed meal, 20 pounds sulphate of potash	2100
Nothing	2300
70 pounds acid phosphate, 70 pounds cottonseed meal	2250
36 pounds acid phosphate, 140 pounds cottonseed meal	1950
36 pounds acid phosphate, 140 pounds cottonseed meal	2500
10 pounds sulphate of potash, 80 pounds lime	2300

Table 21.—Crates onions per one-seventh acre, 1913, W. A. Cone, Webb county, experiment 320.

Plot No.	Application.	Crates.
1	Nothing	30
2	30 pounds acid phosphate	32
3	50 pounds acid phosphate, 190 pounds cottonseed meal	25
4	50 pounds acid phosphate, 190 pounds cottonseed meal, 30 pounds potash	34
5	30 pounds acid phosphate, 190 pounds cottonseed meal, 60 pounds potash	35
6	190 pounds cottonseed meal	30
7	2400 pounds barnyard manure	35

W. A. Cone, Laredo, Webb County. Experiment 319. Good soil of uniform character. Produces about 15,000 pounds of onions. In cultivation seven years. Upland, loam, chocolate color, with clay subsoil. Drainage good. Land broken in November. Bermuda onions were planted in November. Rows 450 feet long. All plots had some treatment after fertilizing.

W. A. Cone. Experiment 320. The soil was similar to that used in Experiment 319. Plots one-seventh acre.

W. M. Plaster, Bedias, Grimes County. Experiment 321. Spanish peanuts, rows thirty-six inches apart, land cultivated twenty years, hilly but next to creek bottom. Light sandy clay surface soil, stiff dark clay subsoil. Peanuts planted March 13, harvested August 28. Four rows per plot, three feet apart, 110 yards long. Lime applied two weeks before planting.

Table 22.— Peanuts per acre, 1911, W. M. Plaster, Grimes county, experiment 321.

Application.	Bushels peanuts.	Pounds hay.
No fertilizer	110	6400
160 pounds acid phosphate	165	9900
1,000 pounds hydrated lime	183	8800
160 pounds acid phosphate and 10 pounds sulphate of potash	183	9900
160 pounds acid phosphate and 50 pounds sulphate of potash	147	6600
160 pounds acid phosphate and 70 pounds cottonseed meal and 10 pounds sulphate of potash	147	6600

Table 23.—Pounds kafir corn fodder per acre, 1915, William T. Dudgeon, Potter county, experiment 322.

Plot No.	Application.	Pounds.
1	Nothing	4150
2	150 pounds acid phosphate	5430
3	200 pounds cottonseed meal	5080
4	150 pounds acid phosphate, 10 pounds cottonseed meal, 50 pounds nitrate of soda	5530
5	150 pounds acid phosphate, 200 pounds cottonseed meal	6470
6	150 pounds acid phosphate, 200 pounds cottonseed meal, 20 pounds sulphate of potash	6760
7	150 pounds acid phosphate, 200 pounds cottonseed meal, 50 pounds sulphate of potash	6760
8	Nothing	4360
9	Ten loads manure	5140
10	150 pounds acid phosphate, ten loads manure	6820

W. T. Dudgeon, Amarillo, Potter County. Experiment 322. Seven and three-fourths miles north of Amarillo, soil moderate and uniform. Land has been cultivated four years, raising two crops of milo and three of kafir. Average yield two tons of kafir fodder per year. Upland with reddish loam surface soil and clay subsoil. Land lies on moderate slope. Manure has been used with good results. Land broken in December, kafir corn planted on May 29. Fertilizer applied by hand after planting, and mixed with dirt with spiked drag. Four rows per plot, three and one-half feet apart and 312 feet long. Stand poor. Plots 9 and 10 contained volunteer plants from manure; these were cut out.

William M. Garrett, Center Point, Kerr County. Experiment 323. Land located in town. Produces about twelve and one-half bushels of corn, has been in cultivation about ten years. First bottom land, dark red surface soil with a stiff clay subsoil. No fertilizer was ever used on this plot. Cabbage planted July 11, 1911, and harvested from October 15 to November 1. Two rows two and one-half feet apart, and 400 feet long. The land was broken early in the fall, rebroken in the spring and put in fine shape for the experiment. No rain on the crop from the time the crop was planted until the crop was harvested. Three irrigations were made.

Table 24.—Pounds cabbage per acre, 1911, W. M. Garrett, Kerr county, experiment 323.

Application.	Pounds.
No fertilizer	6360
400 pounds cottonseed meal	8120
300 pounds acid phosphate and 400 pounds cottonseed meal	9800
300 pounds acid phosphate, 400 pounds cottonseed meal and 20 pounds muriate of potash	6240
300 pounds acid phosphate, 400 pounds cottonseed meal, 100 pounds muriate of potash	9980
No fertilizer	7200
20 loads manure	8140

DETAILS OF EXPERIMENTS WITH COTTON—1911.

G. H. Knellinger, Route 2, Lufkin, Angelina County. Experiment 346. Land located two and one-half miles east of Lufkin. Good uniform soil, both fields cleared and plowed last June. Not in cultivation in ten years. Upland soil, light loam surface soil with a darker

subsoil twenty inches below the surface. Fertilized land last year gave 254 pounds lint to the acre, and neighbors averaged only one-fourth bale. Cotton planted May 9, and harvested October 12, 1911. Four rows four feet apart and 280 feet long. Harrowed May 15, cultivated May 26, chopped May 31, cultivated June 7, much rain. Cultivated June 26, rained from July 4 to July 8, cultivated July 11. All crops injured by worms. Rain in July made cotton throw off nearly all worms. Worms took possession about August 24, and cleaned it up. First picking September 9. Lot 7 was crossed at one end by an old fence row which, together with thirty-nine more stalks than lot No. 1, largely accounts for the increase in cotton.

Description of soils No. 6010. Depth 0″-12″. Located two and three-fourths miles east of Lufkin, Angelina County, a triangular field on south side of the public road, Will Massingill survey. This is slightly rolling upland and is well drained. Corn and cotton are the principal crops. It produced last year one-half bale of cotton per acre, which was an exceptional yield, as the land is worn out from long cultivation and abuse. Fertilizer increases the yield. The soil is a dark brown sandy loam, which runs together in wet seasons, gets hard in dry seasons, and dries into clods. It does not crack. Dirt does not wash onto it, though the soil washes off a little. The land has been cultivated since 1850. The sample represents much of that part of the county in which it occurs.

No. 6011. Depth 12″-24″. Subsoil to 6010. This is a dark brown clay.

Table 25.—Seed cotton, pounds per acre, 1908.

Laboratory No.		Nothing—2	Nothing—7	200 lbs. acid phosphate.	200 lbs. acid phosphate, 30 lbs. cottonseed meal.	200 lbs. acid phosphate, 100 lbs. cottonseed meal.	200 lbs. acid phosphate, 300 lbs. cottonseed meal, 5 lbs. muriate of potash.	200 lbs. acid phosphate, 300 lbs. cottonseed meal, 12.5 lbs. muriate of potash.
324	Henry, Brazos county	920	.....	1180	1020	1190	1200	1240
325	Peters, Brazos county	480	.....	480	480	510	530	580
326	Faison, Leon county	290	.....	400	430	460	410	420
327	Wutrich, Williamson county	530	530	530	570	560	560	570
	Average	580	.....	648	625	680	675	703

Herbert Lynch, Hooks, Bowie County. Experiment 347. Land located eight miles southeast of New Boston. Fairly uniform soil, moderate in fertility; produces twenty bushels corn and one-fifth bale cotton. Land in cultivation about thirty years. Hilly upland soil, surface soil light sand, subsoil red clay. Land broken February 1. Cotton planted May 11, harvested September 20 and December 20. The fertilizer was distributed by hand. Four rows three and a half feet apart and 280 feet long. Chopped out May 2 and 29 and culti-

vated three times with a cultivator. One row of the unfertilized plot was affected to an advantage by an adjoining fertilized plot. On account of wet weather insufficient cultivation was given the land.

S. D. Crampton, Route 1, Nash, Bowie County. Experiment 348. Land located one mile north of Nash. Produces about one-third bale to the acre, and has been in cultivation about seventeen years. Hilly land, light sandy surface soil and a yellow sandy subsoil. Fertilizer with acid phosphates gave good results. Cotton planted the first of May and harvested October 10. Four rows four feet apart, 280 feet long; all worked well, but hot winds ruined it. The third plot gave best results. The stand was bad on the first unfertilized plots.

R. L. Bush, Fairland, Burnet County. Experiment 349. Land one mile north of Fairland. Produces twenty bushels of corn or one-fourth bale of cotton. In cultivation forty years. Upland soil at the foot of a range of hills. Surface soil is a red sandy loam and the subsoil is a yellowish clay. Barnyard manure has given good results. Soil planted May 8 and harvested in September and November. Sixteen rows three feet apart, 270 yards long. Bad stand on No. 6. Nos. 1 and 2 slightly affected by a peach tree fifteen feet from one corner. Cotton much injured by dry weather.

Description of soils Nos. 4336-4337. Depth 0″-9″. Located one mile north of Fairland, Burnet County, farm of A. L. Bush, William Ingram survey of 320 acres. This is moderate to good upland, sloping and well drained. It produces one-fourth bale of cotton and twenty bushels of corn per acre. Cotton, corn, oats, and hay are the principal crops. Barnyard manure and nitrate of soda have been applied to the soil with good results. The native vegetation is mesquite grass and Colorado grass. The soil is a reddish brown fine sand. Fine crops are made in wet seasons, but in dry seasons crops are short. The soil packs, but does not crumble nor crack. The under drainage is good except in patches. It washes to some extent and on lower parts dirt washes onto it. The land has been under cultivation for forty to fifty years. The sample represents about sixty acres of the farm and several hundred acres in the county. No green crops have been plowed under. Manure has been used at the rate of one ton per acre. The soil lies at the foot of a range of sandstone hills. The soil near the rocks is redder, looser, and packs but little; further away on level ground, the soil is almost black. The latter produces better in average years, while in dry years the red does better.

No. 4337. Depth 9″-21″. Subsoil to 4336. This soil is a reddish fine sand.

Table 26.—Seed cotton, pounds per acre, 1909.

Laboratory No.		Nothing—2	200 lbs. acid phosphate.	200 lbs. acid phosphate, 30 lbs. cottonseed meal.	200 lbs. acid phosphate, 100 lbs. cottonseed meal.	200 lbs. acid phosphate, 30 lbs. cottonseed meal, 5 lbs. muriate of potash.	200 lbs. acid phosphate, 30 lbs. cottonseed meal, 12.5 lbs. muriate of potash.	40 loads manure.
328	Nall, Brazos county	265	405	333	330	330	355	.....
329	Willis, Ellis county	560	600	700	720	690	800	.....
330	Smith, Erath county	320	220	330	230	300	340	.....
331	Simmes, Fannin county	180	220	220	270	340	350	.....
332	Van Kirk, Fannin county	190	310	240	290	290	280	.....
333	Powell, Houston county	1015	1155	1210	1235	1205	1215	1320
334	Gatlin, Johnson county	240	350	330	310	310	310	.....
335	Stanfield, Kaufman county	75	90	93	100	93	100	.....
336	Griffin, Limestone county	125	390	390	400	300	270	.....
337	Lewis, Navarro county	440	490	510	540	530	550	.....
338	Foster, Panola county	1090	1070	2640	2060	1800	1650	.....
339	Loving, Smith county	640	770	810	880	840	790	.....
340	Harvey, Tarrant county	120	150	180	195	203	203	.....
	Average	405	478	614	582	556	555	1320

J. H. Sandridge, Altoga, Collin County. Experiment 350. Land nine miles northeast of McKinney. Uniform land produces one-half bale of cotton and has been in cultivation for ten years. Light second bottom land formerly timbered; no fertilizer was ever used. The cotton was planted April 13, and harvested October 18. The beds were opened by shovel and fertilizer was distributed by hand. Four rows three and one-half feet apart and 310 feet long. Three plowings. No difference noted in the appearance of the crops.

Description of soils Nos. 5953-5954. Depth 0″-6″. Located nine miles northeast of McKinney, Collin County. This is a fifty-acre farm on Sist or Grove Creek, formerly owned by S. P. Beard, James Fisher survey. It is second bottom land, subject to overflow, and is considered good soil. It produces one-half bale of cotton, forty bushels of corn, or fifty bushels of oats per acre. The principal crops are corn, cotton, oats, and potatoes. No fertilizer has been applied. The native vegetation is oak and elm timber. The soil is a black loam, which dries very slowly when thoroughly saturated. It gets hard in dry seasons, but holds moisture well. It does not pack, wash, or crack, but crumbles on drying. Not much dirt washes onto it. There is not much surface drainage. The land has been under cultivation for eighteen years. The sample represents nine-tenths of the farm. Blood weeds plowed under made soil very loose, and increased yield one-third. Very little manure has been used. No results first year.

No. 5954. Depth 6″-18″. Subsoil to 5953. This soil is a black clay.

Table 27.—Seed cotton, pounds per acre, 1910.

Laboratory No.		Nothing—3	20 lbs. acid phosphate.	200 lbs. acid phosphate, 60 lbs. cottonseed meal.	200 lbs. acid phosphate, 120 lbs. cottonseed meal.	200 lbs. acid phosphate, 60 lbs. cottonseed meal, 5 lbs. muriate of potash.	200 lbs. acid phosphate, 60 lbs. cottonseed meal, 12.5 lbs. muriate of potash.	3000 lbs. barnyard manure.	200 lbs. Thomas phosphate.	200 lbs. acid phosphate, 12.05 lbs. muriate of potash.
341	Substation No. 1, Bee county.....	590	615	608	830	805	790	.....	670	610
342	Jordan, Cass county.....	520	270	590	660	660	570	.....	.....	.....
343	Hamon, Hopkins county.....	950	1000	1100	940	1120	1090	.....	.....	.....
344	Substation No. 2, Smith county...	540	570	560	740	710	730	880	830	880
345	Spencer, Wise county.....	570	660	650	540	520	540	.....	.....	.....
	Average.....	634	621	702	742	763	744	880	750	795

F. M. Morris, Aubrey, Route 2, Denton County. Experiment 351. Land located four miles southwest of Aubrey, Denton County; produces one-third bale of cotton, twenty bushels of corn. In cultivation thirty years; upland; soil nearly level; drains well; white sandy soil eighteen inches deep to red clay subsoil; never used any fertilizer. Cotton was planted May 18, fertilizer distributed by hand in the furrow; four rows, four feet apart, 280 feet long. Land was flat broken in the previous fall six inches deep. Cultivation was frequent and shallow. The experiment was interfered with by the dry weather and a hard frost destroyed about one-half of the bolls early in November.

Description of soils Nos. 5943-5944. Depth 0″-9″. Located four miles southwest of Aubrey, C. B. Emmons survey. This is upland, slightly rolling. Drainage is good. It produces one-third bale of cotton, twenty-five bushels of corn, thirty bushels of oats per acre. This land has been under cultivation fourteen years. No hard lumps in dry seasons. Soggy in very wet weather. Does not pack, crumbles, cracks, washes much. Stands drouth well. Peas and crab grass plowed under with good results. Manure in small amounts gave splendid results. Soil is gray sandy.

No. 5944. Subsoil to 5943. Depth 9″-21″. This soil is yellowish red sandy.

Table 28.—Seed cotton per acre, 1911.

Laboratory No.		Nothing—1	Nothing—7	160 lbs. acid phosphate.	160 lbs. acid phosphate, 70 lbs. cottonseed meal.	160 lbs. acid phosphate, 140 lbs. cottonseed meal.	160 lbs. acid phosphate, 140 lbs. cottonseed meal, 12.5 lbs. sulphate of potash.	160 lbs. acid phosphate, 140 lbs. cottonseed meal, 25 lbs. sulphate of potash.	10 loads of manure.	1000 lbs. lime.
346	G. H. Knellingsr, Angelina county	380	530	1050	1080	1100	1090	1220	.....	.....
347	Herbert Lynch, Bowie county....	230	230	330	430	390	440	500	380	.....
348	S. D. Campton, Bowie county....	200	.....	410	490	560	510	560	.....	.....
349	R. L. Bush, Burnett county.....	380	400	370	400	410	410	360	390	.....
350	J. H. Sandidge, Collin county.....	430	510	440	470	450	480	540	.....	.....
351	F. M. Morris, Denton county.....	750	900	950	1280	1160	.....	1280	1060	950
352	S. L. Sealy, Lee county.....	410	390	540	550	540	.....	610	810	430
353	R. Windsor, Leon county.....	860	.....	980	940	940	890	900	.....	.....
354	W. M. Farmer, Milam county....	220	.....	240	280	300	220	270	.....	.....
355	O. W. Sherrill, Navarro county...	1620	1750	1650	1840	1900	1860	1850	1800	.....
356	C. Gilliam, Rusk county.....	150	180	300	430	480	.....	380	420	160
357	J. H. Hines, San Augustine county	620	.....	880	970	1040	990	1220	.....	.....
358	R. F. Herndon, Trinify county....	1180	.....	890	1170	1200	.....	1200	.....	830
	Average.....	572	611	695	851	805	765	838	810	593

S. L. Sealy, Route 2, Lexington, Lee County. Experiment 352. Poor uniform soil, produces ten bushels corn per acre and 300 pounds cotton. In cultivation five years. Upland soil, red sandy surface soil twelve inches deep with a yellow clay subsoil. Broken about January 1. Cotton planted April 13, and harvested October 9; four rows, three feet eight inches apart and 282 feet long. Middle broken out with sweep; fertilizers put out and bedded with turning plow. All the crops were damaged by drouth.

Description of soils Nos. 4326-4327. Probably Orangeburg fine sand. Depth 0″-5″. Located two and one-half miles southwest of Tanglewood and one-half mile west of Rockdale road, Robert Finney survey. This is well drained upland of moderate fertility. It produces fifteen bushels of corn per acre. Corn and cotton are the principal crops. No fertilizer has been applied. Sage grass constitutes the native vegetation. The soil is a red sand, which withstands well both wet and dry seasons. It does not pack nor crack, and dries to crumbs. It does not wash, and dirt does not wash onto it. The surface and under drainage are good. It has been cultivated for sixty to seventy years. The sample represents one-half of the farm and one-fourth of the county. No green crops have been plowed under and no manure has been applied.

No. 4327. Depth 5″-18″. Subsoil to 4326. This is a red sand like the surface soil.

R. Windsor, Route 2, Buffalo, Leon County. Experiment 353. Land located nine miles north of Buffalo. Moderate soil, in cultivation sixteen years, and produces one-third bale of cotton per acre. Upland sandy loam, yellowish red in color, with a reddish clay subsoil. Land broken in the early part of January, planted in cotton May 17, and

first picking October 10. Four rows, four feet apart, 280 feet long. Land was thoroughly broken and broadcast twice very early and well cultivated during growing season. The last shallow plowing the middle of August. All the crops were damaged by boll weevil and boll worm. It was planted too late to obtain the best results.

Description of soils Nos. 3367-3368. Depth 0″-7″. Located nine miles south of Buffalo, Freestone County. Pre-emption section, S. W. Weims survey. The sample was taken on a rise in the center of the field close to an old peach tree. This is rolling land, well drained, and of moderate fertility. It produces fifteen bushels of corn or one-third bale of cotton per acre. Corn, cotton, and peas are the principal crops. No fertilizer has been applied. The soil is a light reddish sand, which packs, and crumbles on drying. It does not crack, does not wash, and dirt does not wash onto it. The under drainage is good. It has been cultivated for fifty-four years. The sample represents two-thirds of the farm, and is an average for the county. Crab grass and weeds have been plowed under, improving the soil mechanically. No manure has been applied.

No. 3368. Depth 7″-19″. Subsoil to 3367. This soil is a light red clay.

W. M. Farmer, Route 6, Rockdale, Milam County. Experiment 354. Land located one and one-half miles northwest of Rockdale. Moderate land, uniform in fertility, producing about one bale to four acres. Land in cultivation five years, but has laid out the last three years. The surface soil is light sand, subsoil a white sand. Fertilizers have given good results. The land has had a coat of weeds on it every year that it laid out and has a good coat of humus. Planted April 10, and harvested November 28. Four rows, three and one-half feet apart, 240 feet long. Shallow cultivation.

Description of soils Nos. 4749-4750. Depth 0″-6″. Located one-half mile southwest of Rockdale, Milam County, farm of W. M. Farmer, on top of a hill on Cobb bridge road. This is rolling land, well drained, and considered poor. It produces one-half to one-fifth of a bale of cotton per acre. Truck is chiefly grown. No fertilizer has been used. The native vegetation is berries, roses, and tomatoes. The soil is a white sand, which does not pack, crumble, or crack on drying. It does not wash, and dirt does not wash onto it. Crops grow well in dry seasons, but the soil is cold and crops have slow growth in wet seasons. The land has been cultivated for five years. The sample represents twenty acres on the farm, and six or eight square miles in the county. No green crops have been plowed under, and no manure has been applied. The land blows very bare in spring.

No. 4750. Depth 6″-18″. Subsoil to 4749. This soil is a white sand.

O. W. Sherrill, Kerens, Navarro County. Experiment 355. Land one-half mile north of Kerens. Uniform land moderate in fertility, producing 600 pounds of seed cotton. In cultivation twenty-seven

years. Upland soil, prairie hog wallow, light surface soil with clay subsoil. Land broken about February 1, cotton planted March 13, and harvested November 15. Fertilizer applied with cotton planter, four rows, three feet apart and 120 yards to the row. Not enough rainfall to make a great difference in results. Barnyard manure at the rate of ten loads to the acre with 200 pounds of ash phosphate produces five bales on four acres, beside the above plot.

C. Gilliam, Route 1, Elderville, Rusk County. Experiment 356. Land located eight miles west of Tatum. Moderate fertile mixed soil produces 600 pounds seed cotton. In cultivation eight years. Upland soil with a light brown loam surface soil and a yellow subsoil well drained. Cotton planted May 15 and harvested October 7. Fertilizer put down and bedded on. Two rows, four feet apart and 280 feet long. All of the crops were damaged by drouth.

J. H. Hines, San Augustine, San Augustine County. Experiment 357. The land is located about two and one-half miles north of San Augustine. Good uniform land producing a bale of cotton to the acre before the boll weevil came. Has been in cultivation eight years. It is a level upland soil with light red loam surface soil and red clay subsoil. The land was broken in January; no fertilizer used; crop planted April 10 and harvested from August 20 to October 20. Two rows, four and one-half feet apart. Bedded in January, fertilizer put out, and rebedded in February; harrowed once; worked every eight days with a harrow or sweeper. All of the crops were damaged by cotton worms.

R. F. Herndon, Trinity, Trinity County. Experiment 358. Uniform moderate soil, produces one-third bale of cotton, and in cultivation fifteen years. Post oak soil, upland. Fertilizer has been used with good results. Planted May 1 and harvested September and October. Four rows, forty inches apart and 320 feet long. The plot not fertilized was laid off on the east end of the other plot and was a good deal better cotton land. Cotton injured by dry weather on all plots.

Table 29.—Yield seed cotton per acre, 1911.

Laboratory No.		Nothing.	Nothing.	10 loads manure.	10 loads manure, 200 lbs. acid phosphate.	10 loads manure, 1000 lbs. rock phosphate.	200 lbs. acid phosphate.	200 lbs. acid phosphate, 20 lbs. sulphate of potash.	10 loads leaf mold.
350	C. M. Walls, Kaufman county	940	880	990	1030	940	920	830	.....
362	C. E. Ormand, Smith county	.....	1570	1820	1630	1500	1230	1410	1210
363	Paul Knouth, Williamson county	590	.....	540	590	780	640	790	.....
	Average	765	1225	1117	1083	1073	930	1010	1210

C. M. Walls, Mabank, Route 1, Kaufman County. Experiment 359. Located four miles north of Mabank. Uniform soil. Produces twenty-five bushels of corn, one-third bale of cotton. Ten years in cultivation. Second bottom, slightly above overflow. Low sandy loam surface soil, with a dark red subsoil. Could not see any effect of fertilizers from previous years on similar soil. Cotton planted May 4 and harvested September 12 and October 28. Rows were four feet apart and 140 feet long. Each lot was hoed twice and plowed three times. This was considered a failure on account of nine weeks dry weather, with four and one-half inches of rainfall in July, followed by seven weeks dry weather.

Description of soils Nos. 4328-4329. Depth 0"-8". Located four miles north of Mabank, Kaufman County, J. M. Sims survey. This land is moderate bottom, with occasional overflows. Drainage is fair. It produces one-third bale of cotton and twenty-five bushels corn per acre. Most of land has been under cultivation ten years, balance fifteen to twenty years. One hundred pounds of fertilizer used in 1910, but no perceptible difference noted. In wet seasons corn turns yellow when small. In dry seasons vegetable has good color. Soil is a brown fine sandy loam; packs only after rains, crumbles and does not crack; washes slightly, dirt does not wash onto it. No green crops; no manure.

John Stanfield, Scurry, Kaufman County. Experiment 360. Rich soil. Uniform land, produces one-third to one-half bale of cotton, or sixteen bushels of corn. In cultivation sixteen years. Soil light loam surface soil with a clay subsoil. Cotton planted April 12, 1911, harvested in the fall, 1911. Fertilized two weeks before planting. Rows four feet per plot, three and one-half feet apart, 270 feet long.

No. 3 (acid phosphate and cottonseed meal) did not have so good a stand as the other crops. No. 3 would probably have made the most cotton, with a perfect stand. In the early spring the fertilized cotton could be recognized at a glance.

Fertilizer.	Yield seed cotton per acre.
No fertilizer	370 pounds
200 pounds cottonseed meal	510 pounds
200 pounds acid phosphate, 200 pounds cottonseed meal	590 pounds
150 pounds acid phosphate, 200 pounds cottonseed meal, 10 pounds sulphate of potash	560 pounds
150 pounds acid phosphate, 200 pounds cottonseed meal, 50 pounds sulphate of potash	750 pounds

Stanley Waters, Ricardo, Nueces County. Experiment 361. Land located eight miles north of Kingsville. Uniform soil produces from one-third to one-half bale of cotton; in cultivation for three years. Rolling land, light surface with clay subsoil. Drainage good. Cotton planted March 15, 1911, harvested July 12 to August 7, with a little in October. Twelve rows per plot, four feet apart, 95 feet long, cultivated after every rain and whenever necessary, for retaining moisture and removing weeds. All crops were injured by cut worms.

Fertilizer.	Yield seed cotton per acre.
200 pounds of acid phosphate	1170 pounds
200 pounds of acid phosphate, 60 pounds cottonseed meal	1560 pounds
Nothing	1170 pounds
200 pounds acid phosphate, 120 pounds cottonseed meal	1440 pounds
200 pounds acid phosphate, 60 pounds cottonseed meal, 5 pounds muriate of potash	1850 pounds
200 pounds acid phosphate, 60 pounds cottonseed meal, 12.5 pounds muriate of potash	2080 pounds
Barnyard manure	1660 pounds

The variety grown was Hastings small boll variety. The fertilized cotton was the only really good cotton, as it recovered from the cotton worm much better than the others.

C. E. Ormand, Troup, Smith County, Texas. Experiment 362. Land located two miles northeast of Troup. Moderate in fertility, uniform in character, produces about one-third bale of cotton to the acre. Land in cultivation about thirty-five years. Gray sandy land, subsoil yellow, bottom subsoil red clay. Barnyard manure gives good results on this land. Four rows per lot. First working with walking cultivator. Second working after chopping May 20, siding up with heel sweep, June 28. Some damage by heavy rains to several of the plots. Plots 1 and 7 had decidedly the better stand. Planted April 14, four rows per plot, three and one-half feet apart, 300 feet long. Mebane Triumph planted.

Paul Knauth, Weir, Williamson County, Texas. Experiment 363. Land located one-half mile from Weir. Uniform land, produces one-half bale of cotton, or forty bushels of corn. In cultivation twelve years. Upland prairie soil with a black surface soil and a chalky subsoil. Land was in cotton last year. Ran out stalks with a ten-inch hand plow, harrowed down level, laid off three-foot rows with eight-inch diamond shovel on cultivator, then bedded up with twenty-four-inch sweep. Cotton planted April 1, picked August 24 and September 12; six rows per lot, three feet apart, 243 feet long. Crops were cut short by the dry weather.

Description of soils Nos. 5966-5967. Depth 0"-10". Located one-half mile north of Weir, Williamson County, Texas, Samuel Virn survey. The sample was taken 150 yards northwest of the house. This is good upland locally known as "black land." It produces thirty-five bushels of corn or one-half bale of cotton per acre. Corn and cotton are the principal crops. A small amount of fertilizer has been used, but apparently it has not done much good. The native vegetation consists of sage grass. The soil is a black clay which acts all right in wet seasons but cracks and dries badly in drouths. It does not pack, and crumbles on drying. The surface drainage is good. The land has been in cultivation for fourteen years. The sample represents two-thirds of the farm and two-thirds of the county. No green crops have been plowed under. Ten to twelve loads of manure per acre give good results in wet seasons, but do harm in dry seasons.

No. 5967. Depth 10"-18". Subsoil to 5966. This soil is black clay, like the surface soil.

DETAILS OF EXPERIMENTS—COTTON, 1912.

Edward Wersebe, San Antonio, Bexar County, R. F. D. No. 7. Experiment 364. Located thirteen miles southwest of San Antonio. Orangeburg fine sandy loam soil, uniform character, produces one-fourth bale of cotton, twenty to twenty-five bushels of corn, in cultivation twenty years. Red sandy loam surface soil with a joint red clay subsoil. Never used any commercial fertilizer, but has used farm manure. Cotton planted April 4, and harvested in October, 1912. Four rows per plot, four feet apart, 280 feet long. Middles plowed April 19, plowed April 29, plowed May 11, chopped May 13, plowed May 17, plowed May 29, first bloom June 6, plowed June 13, plowed July 1. Plot No. 1 had top soil blown on and was better than the others.

Description of soils Nos. 7343-7344. Depth 0″-11″. Located thirteen miles southwest of San Antonio, Bexar County. This is upland soil, somewhat rolling, and is considered moderate in fertility. It produces 500 pounds of seed cotton and twenty-five to thirty bushels of corn per acre. The soil is a reddish brown sand, which packs and crumbles on drying. It is known as sandy mesquite. It produces small growth in wet seasons, and the crop is stunted in dry seasons. Cotton does not die. The land has been cultivated for twenty years. The sample represents ten acres of the farm and thousands of acres in the county.

No. 7344. Depth 11″-24″. Subsoil to 7343. This is a red sand.

H. J. Klorres, Velasco, Brazoria County. Experiment 365. Eight miles from Velasco. Good uniform land. Produces three-fourths bale of cotton. In cultivation eighteen years. Hill land with gray sandy clay soil with hard clay subsoil. Drainage natural. Fertilized by hand and mixed in with small sweep. Four rows to the plot, three feet ten inches apart, and 280 feet long. Cultivated with a two-horse cultivator April 27, May 27, June 13, and July 3. Used sweep June 19 and July 15. Chopped out May 7. Replanted May 14 and June 12. Cut worms damaged all plots and especially the replanted cotton. The soil on plot 10 packed so that the seed did not come up and rain delayed replanting.

Table 30.—Seed cotton per acre, 1912.

Laboratory No.		Nothing—1	Nothing—8	150 lbs. acid phosphate.	200 lbs. cottonseed meal.	150 lbs. acid phosphate, 300 lbs. cottonseed meal.	150 lbs. acid phosphate, 200 lbs. cottonseed meal.	150 lbs. acid phosphate, 200 lbs. cottonseed meal, 20 lbs. sulphate of potash.	150 lbs. acid phosphate, 200 lbs. cottonseed meal, 50 lbs. sulphate of potash.	10 loads manure.	150 lbs. Thomas phosphate.	200 lbs. rock phosphate.
364	Edward Wersebe, Bexar Co.	590	330	460	530	630	520	600	630	540	.....	380
365	H. J. Klorres, Brazoria Co.	1340	1330	1680	1570	1660	1720	1700	1650	2140	.....	.....
366	C. A. Preston, Calhoun Co.	390	400	470	500	510	.....	530	560	510	.....	530
367	J. S. Jones, Cherokee Co.	890	1060	950	1130	.....	1180	1200	.....	1440	.....	1280
368	W. T. Foote, Clay Co.	1120	1420	920	1450	1280	1400	1710	1430	1200	.....	1210
369	A. Dittman, Comal Co.	530	560	490	480	450	540	480	460	600	.....	.....
370	J. M. Campbell, Dallas Co.	810	870	940	750	890	880	820	890	1550	.....	630
371	Sam W. Harper, Denton Co.	750	.....	720	800	850	810	790	830	800	.....	.....
372	E. B. Powers, Ellis Co.	1150	1190	1220	1110	1170	1180	1090	1100	1190	.....	.....
373	Alvin Albers, Fayette Co.	670	580	770	730	830	850	880	910	910	.....	700
374	R. Windsor, Freestone Co.	430	.....	450	470	540	600	510	650	.....	.....	670
375	J. H. Thomas, Hill Co.	700	.....	800	790	790	830	820	750	.....	.....	650
376	J. T. Lamm, Hunt Co.	790	760	800	800	810	800	830	790	750	.....	730
377	John Stanfield, Kaufman Co.	740	.....	950	1110	1250	1180	1440	.....	.....	750	.....
378	Fritz Patschernick, Kendall Co.	530	538	480	520	680	490	620	650	580	.....	540
379	S. L. Sealy, Lee Co.	580	.....	450	610	710	640	750	860	660	.....	680
380	W. M. Begony, Limestone Co.	770	810	950	790	960	1030	940	1030	780	.....	940
381	P. H. Orrick, Madison Co.	800	930	920	910	1050	990	1040	1170	730	.....	.....
382	J. M. Gibbs, Madison Co.	890	940	1040	1040	1090	1090	1120	1050	1180	.....	.....
383	J. D. Henson, Robertson Co.	680	720	590	680	700	600	550	.....	.....	.....	.....
384	G. W. Young, Rusk Co.	980	900	1020	1170	1180	1240	1110	1090	1710	.....	.....
385	L. O. Busch, Travis Co.	320	340	270	340	450	320	440	370	700	.....	.....
386	M. M. Reynolds, Trinity Co.	.....	970	1130	1090	1310	1160	1240	1250	1170	.....	.....
387	C. B. Holmes, Trinity Co.	600	670	810	860	1090	860	950	1020	730	.....	780
388	A. Ray, Victoria Co.	660	690	890	840	1030	1010	990	1000	1240	1150	.....
389	J. M. Henry, Wilson Co.	470	320	530	490	560	630	560	600	440	.....	.....
	Average.	727	762	796	829	899	902	837	901	980	950	731

C. A. Preston, Magnolia Beach, Calhoun County. Experiment 366. Eleven miles northwest of Port Lavaca. Moderately good land, mixed. Produces one-fifth bale of cotton. In cultivation two years. Previously a pasture. Prairie land. Medium sandy soil with clay subsoil. Land broken January 1. Cotton planted March 10. Fertilizer applied with a distributer. Four rows per plot, forty-two inches apart, and 280 feet long. Ordinary cultivation was practiced. Plots 4, 5 and 6 were damaged by ant hills. Fertilized plots matured earlier and were gathered six weeks before the remainder of the crop.

Description of soils 7171-7172. Depth 0″-6″. Located seven miles southeast of Port Lavaca, Calhoun County. This land is flat and uniform, no hard lumps. It produces one-fourth bale of cotton. Parts of field rather sandy with subsoil nearly at surface in places. Farm manure doubled the yield of cotton. Soil is dark gray fine sand; it packs and runs together and does not produce a good stalk. Crop stands drouth well if cultivated four to five inches deep.

No. 7172. Subsoil to 7171. Depth 6″-16″. This soil is brown gray.

W. S. Jones, Jacksonville, Cherokee County. Experiment 367. One and three-fourths miles north of Jacksonville. Fairly good land and uniform. Produces one-half bale of cotton. In cultivation five years. Previous history not known. Upland, gray sandy soil with red clay

subsoil. Drainage fair. Land broken in December. Cotton planted April 30 and harvested from August 23 to September 20. Fertilized by hand. Four rows to the plot, four feet apart, and 280 feet long. Plowed ten inches deep February 6. Double-disked once. Harrowed three times, chopped to eighteen inches, cultivated five times and hoed twice. Plots 1, 2, 3, 5, 6 and 8 died out after picking. Plot 1 planted next to corn.

Description of soils Nos. 7089-7090. Depth 0″-9″. Located one and one-half miles north of Jacksonville, Cherokee County. This is valley land, nearly uniform, and considered of moderate fertility. No fertilizer or manure has been applied and no green crops have ever been plowed under. The soil is a reddish gray sand. Plants produce a good stalk. Cotton dies in spots. The land had been cultivated for six years. The sample represents ten acres of the farm.

No. 7090. Depth 9″-12″. Subsoil to 7089. This is a red sand.

G. A. Foote, Byers, Clay County. Experiment 368. Two miles west of Byers. Moderately good uniform land. Produces one-eighth to one-third bale cotton. In cultivation three years. Upland grayish red sandy loam with clay subsoil. Good drainage. Land broken December 11, cotton planted April 20 and harvested in September. Fertilizer applied April 13. Six rows per plot, three feet four inches apart, and 210 feet long. Cultivation throughout was shallow with six and ten-inch sweeps.

V. Dittmar, New Braunfels, Comal County. Experiment 369. Five miles south of New Braunfels. Land moderately good and uniform. Produces thirty-five bushels of oats. In cultivation fifty years. Previously planted alternately in cotton and corn. First bottom land, dark sandy loam; subsoil same. Well drained. Land plowed in December. Cotton planted March 27. Fertilizer put out by hand. Two rows per plot, three feet two inches wide and 615 feet long. Plots 3, 4, 6, and 7 were damaged by dying out in spots. These were replanted but the plant did not yield well.

Description of soils Nos. 7097-7098. Depth 0″-10″. Located five miles south of New Braunfels, Comal County, J. S. Johnson survey. This is a brown or dark gray moderate and uniform clay, locally known as "bottom land." It is uniform and has hard lumps. Soil gets hard in wet years, but yield is greater than in dry years. It packs, runs together and clods. It has been cultivated fifty to sixty years and no fertilizer has been used; thirty to forty loads of manure per acre doubles the yield. This sample represents forty acres of the farm and thousands of acres along the Guadalupe river. One acre produces one-third bale cotton, thirty-five bushels corn, or thirty bushels oats.

No. 7098. Subsoil to 7097. Depth 10″-22″. This is a dark gray soil, which turns black when wet. It is a uniform soil and contains hard lumps.

J. M. Campbell, Richardson, Dallas County. Experiment 370. Two miles north of Richardson. Land moderately good and uniform. Pro-

duces forty bushels corn and one-half bale of cotton. In cultivation fifty-six years. Upland, slightly rolling. Gray black soil with a lighter subsoil. Drainage good. Cotton planted April 22 and harvested October 1 to November 1. Fertilized by hand in furrow under cotton. Seven rows per plot, forty inches apart, and sixty yards long. Flat broken December 5. Bedded in February. Fertilizer distributed March 20. Plot 10 was injured by lice.

Description of soils Nos. 7181-7182. Depth 0″-11″. Located two miles north of Richardson, Dallas County, Texas, William Hughes survey. This is rolling land and is considered of uniform and moderate fertility. It produces forty bushels of corn, fifteen bushels of wheat and forty bushels of oats per acre. No fertilizer or manure has been applied, and no green crops have been plowed under. The soil is a black clay which does not pack, run together, or clod. It crumbles on drying. The local name is "black waxy." Plants produce a medium stalk. Cotton does not die. The land has been cultivated for sixty-four years. The sample represents 100 acres of the farm and two-thirds of the county.

Sam W. Harper, Sanger, Denton County. Experiment 371. Three and one-half miles north of Denton. Land moderately good and uniform. Produces 400 to 600 pounds of seed cotton and fifteen to thirty bushels of corn. In cultivation thirty-eight years and has always been moderately productive. Upland, gently sloping. Dark red loam, with red clay subsoil. Drainage good. Land broken in March. Cotton planted May 15 and harvested in September, November, and December. Fertilizer applied with cotton planter. Four rows per plot, three feet apart and 120 yards long. A bad stand was obtained on all plots and it was too late to plant over. All plots were about the same with regard to stand.

E. B. Powers, Waxahachie, Ellis County. Experiment 372. University addition, Waxahachie. Black waxy soil (Houston black clay), in cultivation twenty years or more, well drained, twenty feet deep or more. Cotton planted three rows per plot, three feet three inches apart. Land flat broken January 25, harrowed January 26, harrowed February 10, harrowed March 15, and harrowed April 18. The lint ran thirty-six pounds to the hundred or more.

Alvin Alberts, Waldeck, Fayette County. Experiment 373. Located one-half mile from Waldeck. Moderate mixed land. Produces twenty bushels corn or one-third bale of cotton. In cultivation about twenty years. Upland soil, dark sand surface soil, with a dark clay subsoil. Never used any fertilizer. Cotton planted April 14 and 15, harvested August 10 and September 20, 1912. Fertilizer applied with cotton planter after land was center furrowed, listed, and ready to plant. Three rows per plot, three and one-half feet apart, 430 feet long. As soon as the cotton was up it was plowed and thinned and given three plowings afterwards. This year's season was rather dry.

Description of soils Nos. 7155-7156. Depth 0″-5″. Located about one-half mile northeast of Waldeck, Fayette County, Texas, J. Vander-

werth's survey. This is rolling land, not subject to overflows. It is moderately fertile though not uniform. It produces about one-half bale of cotton and twenty-two bushels of corn per acre. The principal crops are corn, cotton, and cowpeas. No fertilizer has been applied, except cottonseed this year at the rate of 300 pounds per acre. Manure has been applied with good effect. The soil is a gray fine sand and not uniform, which packs in places, runs together in places, and clods. It crumbles on drying. Plants do not produce a good stalk unless manure is applied. Cotton does not die. The land has been under cultivation for perhaps over twenty years. The sample represents about one-third of the farm. No green crops have ever been plowed under.

No. 7156. Depth 5″-10″. Subsoil to 7155. This is a dark gray clay.

R. Windsor, Buffalo, Freestone County. Experiment 374. Nine miles from Buffalo. Moderately good land, produces sixteen bushels of corn or one-fourth bale of cotton. In cultivation about fifty years. Upland, timber land, with red and light sandy surface soil and red clay subsoil. Cotton planted May 14, harvested first week in September and last week in October, 1912. Four rows per plot, four feet apart, 280 feet long. Land broken in January, then harrowed, rebedded, harrowed and planted. Cultivated six times with a cultivator and rows broken out with sweep in August. The crop was badly hurt by a storm and by a severe drouth, but it never stopped growing, as he kept stirring the soil. He had only one rain and one shower during the growing season.

Description of soils Nos. 3367-3368. Depth 0″-7″. Located nine miles south of Buffalo, Freestone County, on rise in center of field close to an old peach tree, G. W. Weims survey. This is a light reddish sandy loam, locally known as "sandy." It has good drainage and is in rolling country. This soil packs and crumbles but does not crack and wash. It has been in cultivation fifty-four years and no fertilizer used. Crab grass and weeds when plowed under help mechanically. The chief crops are cotton, peas, and corn. One acre produces fifteen bushels of corn, or one-third bale of cotton.

No. 3368. Depth 7″-19″. This is a subsoil to 3367. It is a light red clay.

Mr. J. H. Thomas, R. F. D. 6, Whitney, Hill County. Experiment 375. Moderate soil, in cultivation about ten years, producing one-half bale of cotton. Dark sandy loam upland, with red clay subsoil. Cotton planted the last of April. Fertilizer applied in planter furrow, three rows per plot, three feet apart and 140 yards long. All the plots were damaged by dry weather.

J. T. Lamm, Greenville, Hunt County. Experiment 376. Six miles north of Greenville. Good soil of uniform character. Produces two-thirds bale of cotton. In cultivation one year. Previously woodland. Upland, black soil with clay subsoil. Drainage fairly good. Land broken January 15, planted in cotton April 23, and harvested October

25. Fertilized by hand. Two rows to the plot, three feet apart, and 225 feet long. Bedded land January 20, fertilized April 19, planted April 23, chopped and plowed May 13. Plowed June 5, hoed June 25, plowed June 26 and July 10. All the plots were damaged by boll worms. Fertilizer seems to be profitable on this black land.

John Stanfield, Scurry, Kaufman County. Experiment 377. Located three miles east of Scurry. Fairly uniform soil. Produces one-fourth bale of cotton, or twelve bushels of corn. In cultivation eighteen years. Dark ash colored surface soil, sandy in character, with a tough dark subsoil. Cotton planted in April, harvested in the fall of 1912. Four plots, four rows per plot, three feet two inches apart, 280 feet long. Plowed six times with cultivator. Dry weather nearly ruined the first crop, but it made the heaviest top crop that the owner ever had.

Fritz Patschernick, Boerne, Kendall County. Experiment 378. Seven miles northwest of Boerne. Land good and uniform. Produces one-fourth bale of cotton and twenty-five bushels of corn. In cultivation ten years. Previously post oak thicket. Nearly level land, chocolate color, with red clay subsoil. Good drainage. Land broken in November. Fertilizer used before in experiments for German Kali works. Cotton planted March 12. Harvested in September. Fertilizer distributed in drill. Two rows per plot, three and one-half feet apart, and 560 feet long. Chopped to eighteen-inch stand May 15. Cultivated once with sulky cultivator and three times with five-tooth harrow twice to row. Only seven inches of rain fell from time of planting to harvest.

Description of soils Nos. 7147-7148. Depth 0″-10″. Located seven miles northwest of Boerne, Kendall County, Texas. The land is slightly slanting from the center to the north, east, south and west. The crop production has been fairly good during the last five years. No fertilizer has been applied except on experimental plots. No manure has been applied except on rocky places, though here the effects were good. No green crops have been plowed under. The soil is a black heavy clay, locally called "chocolate post oak." In wet seasons the behavior of the soil is good if cultivated four days after the rains. In dry seasons the ground will crack badly even if worked continually. The soil packs together, and clods on drying. Plants produce a good stalk. Cotton dies where root rot exists. Part of the land has been cultivated for ten years and part for thirty years. The sample represents three-fourths of the farm.

No. 7148. Depth 10″-24″. Subsoil to 7147. The soil is a red and black mottled clay.

S. L. Sealy, Lexington, Lee County, R. F. D. 2. Experiment 379. Land located two miles southwest of Tanglewood, Texas. Moderate land, uniform in character, twenty years in cultivation, producing about twenty bushels of corn. Upland soil with red loam surface soil and yellow clay subsoil. Fertilizer has given good results. Cotton planted April 15, harvested about September 28, 1912. Two plots per plat, three and one-half feet apart, 200 yards long. A deep furrow was run

and fertilizer put down. Put furrows on by two-horse turn plow. Had no rain on the cotton after June 20th.

W. M. Bigony, Groesbeck, Limestone County. Experiment 380. Six miles west of Groesbeck. Good soil, black with yellow streaks, producing twenty-five bushels of corn and one-half bale of cotton. In cultivation four years, three in cotton and one in corn. Upland, black and yellow soil with clay subsoil. Good drainage. Land broken February 20-25. Cotton was planted May 10 and harvested November 15. Fertilizer distributed in rows. Four rows per plat, three feet apart, and 121 yards long. Ordinary cultivation was practiced. The land was bedded, fertilized in furrow and rebedded.

P. H. Orrick, Madisonville, Madison County. Experiment 381. Two miles south of Madisonville. Moderately good land. Uniform, produces one-half bale of cotton per acre. In cultivation six years. Was previously covered with a thick growth of post oaks. Upland, light land with red clay subsoil. Slightly rolling. Land broken in March. Cotton planted April 21, and harvested in August. Fertilizer applied with a distributer. Six rows per plot, three and one-half feet wide, and sixty yards long. Barnyard manure was applied March 21.

J. M. Gibbs, Madisonville, Madison County. Experiment 382. Two miles north of Madisonville. Soil poor and uniform. Produces twelve and one-half bushels of corn. In cultivation about twenty years. Upland, slightly rolling. Light fine sand with red clay subsoil. Land broken in March. Fertilizer previously used with good results. Planted cotton in April and harvested in August. Fertilizer was applied with a distributer two weeks before planting. Plowed three times with cultivator, plowed twice with a heel sweep, hoed twice. All plots worked alike.

Description of soils Nos. 7159-7160. Depth 0″-8″. Located about two miles from Madisonville, Madison County. This is rolling upland and is considered moderately fertile. It produces one-fourth bale of cotton and fifteen bushels of corn per acre. One hundred and fifty pounds per acre of fertilizer was applied with good effect. The soil is a brown sand, which produces better in wet seasons than in dry. It is known as "post oak soil." It packs, runs together, and clods. Plants do not produce a good stalk. Cotton does not die. The sample represents most of the land of the county.

No. 7160. Depth 8″-20″. Subsoil to 7159. This soil is brown mottled with red clay with some sand.

J. D. Henson, Seale, Robertson County. Experiment 383. Ten miles northwest of Marquez. Land moderately good. Slightly mixed. Produces 750 pounds of seed cotton. In cultivation ten years. Upland. Dark sandy soil with red clay subsoil. Drainage good. Breaks land in January. Has used fertilizer with good results. Cotton planted April 29 and harvested September 28 and November. Fertilized by hand. Four rows per plot, three and one-half feet apart, and eighty

feet long. Land bedded and rebedded two months later. Laid off with twenty-four-inch heel sweep and planted with a walking planter. Heavy rain prevented good stand.

Description of soils Nos. 7177-7178. Depth 0"-6". Located ten miles northwest of Marquez in Robertson County, Texas, W. L. Moss survey. This is fairly level land, moderately fertile and uniform. It produces about 750 pounds of seed cotton and twenty bushels of corn. One hundred pounds per acre of fertilizer was applied in 1908 with good effect. The soil is a light brown sand, known as Susquehanna fine sandy loam. The behavior of the soil and the crop yield is fairly good in both wet and dry seasons. The soil packs and runs together very little, and does not crumble or clod. Plants produce a good stalk. Cotton does not die. The land has been under cultivation for twenty-two years. The sample represents 400 acres of the farm.

No. 7178. Depth 6"-12". Subsoil to 7177. This soil is a reddish gray sand.

Grady Young, Overton, Rusk County. Experiment 384. Two and one-half miles south of Overton. Moderately good land, mixed. Produces one-fourth to one-half bale of cotton per acre. In cultivation fifteen years. Previously covered with post oak, red oak and hickory trees. Upland, dark gray sandy loam soil with red clay foundation for a yellow clay subsoil. Good drainage. Land broken February 1. Has used fertilizer with profitable results. Cotton was planted April 20 and harvested from September 10 to October 25. Fertilizer applied in water furrow and listed on. Four rows to the plot, three and one-half feet apart, and 105 yards long. Land was broken, bedded, and rebedded before planting, and cultivated each week until laid by. Drouth injured all fertilized plots twenty-five per cent. Best results were obtained with barnyard manure.

L. O. Busch, R. F..D. No. 8, Austin, Travis County. Experiment 385. Moderate, uniform land, producing about 250 pounds cotton and twenty bushels of corn per acre, in cultivation about twenty years. Very fertile prairie. Clay loam surface soil, upland, with a yellow clay subsoil. No fertilizer ever used, but planted continually in cotton and corn. Cotton planted on April 12, 1912; harvested August 15th. One row per plot, three feet apart; No. 1, which received no fertilizer, was planted next to a row of corn. No. 10, which received the manure, seemed to do better in every way than any of the others. All the other plots fell below the general average.

M. M. Reynolds, Trinity, Trinity County. Experiment 386. Six miles east of Trinity. Land moderately good and uniform. Produces one-half bale of cotton. In cultivation one year. Hilly land with light sandy soil, with light subsoil. Good drainage. Land broken in January. Planted cotton April 19 and harvested in September and October. Applied fertilizer on April 15. Four rows to the plot, four feet apart and 280 feet long. Cotton chopped out on May 12 and cul-

tivated every ten days until it began to open in August. Drouth affected all of the plots, causing them to be at least one-third short.

C. B. Holmes, Pennington, Trinity County. Experiment 387. Southeast of Groveton. Soil moderately good and uniform. Produces fifteen bushels of corn, one-third bale of cotton. In cultivation fifty years or more. Prairie land, gray sandy soil. Good drainage. Fertilizer has been used profitably. Cotton was planted April 20 but did not come up until June 1. Harvested October 25. Fertilizer applied with "Cole" distributer in drill. One row to a plot, four feet apart, 930 feet long. Plots 1 and 10 might have been affected, as they were outside rows. Four-row plots seem better than one-row plots.

Description of soils Nos. 4370-4371. Depth 0"-12". Located two miles west of Pennington and southeast of the railroad town of Groveton, on the Jones place, M. Tascum league, Dailey survey. This is upland of moderate fertility. It produces one-third bale of cotton and fifteen bushels of corn per acre. Corn and cotton are the principal crops. No fertilizer has been used. The native vegetation consists of crab grass. The soil is a gray or brown sand locally called "gray prairie." It behaves well in wet and dry seasons, but badly in very wet spells. It packs and runs together, and crumbles on drying. It does not crack, does not wash and but little dirt washes onto it. It has been cultivated about forty years. The sample, which was sent in by C. B. Holmes, represents 100 acres of the farm and about ten per cent. of the county. No green crops have been plowed under and no manure has been applied. The drainage is good.

No. 4371. Depth 12"-24". Subsoil to 4370. This soil is gray or brownish fine sand.

A. Ray, Victoria, Victoria County. Experiment 388. East of Victoria. Land good and uniform. Produces one-half bale of cotton and thirty-five bushels of corn. In cultivation fourteen years; was previously ranch land. Upland, sticky black soil, with clay subsoil. Good drainage. Land broken in December. Cotton planted March 27. Harvested August 5-19 and September 12. Fertilizer applied March 18 by attachment on planter. Four rows to the plot, three feet nine inches apart, and 138 yards long. Land was prepared by breaking and disking. Ran out middles with six-inch shovel on April 22. Cultivated on April 25, May 2, May 12, and with disk cultivator June 12. Green fly attacked all plots early in season. The last row in plot 10 produced most, as it had most room, having a blank row next to it.

J. M. Henry, Floresville, Wilson County. Experiment 389. Eight miles west of Floresville. Moderately good land with uniform land for plot, but remainder of field spotted. Produces fifteen bushels of corn and one-fourth bale of cotton. In cultivation fifteen or twenty years. Previously has been planted chiefly to cotton, but occasionally to corn. Upland, light sandy soil with red clay subsoil. Well drained land, broken last of January. Barnyard manure has been used but with small results on cotton. Planted cotton April 13 and harvested

August 30 and November 30. Applied fertilizer by opening ground with a lister and putting down fertilizer by hand and mixed with one-horse cultivator. Three rows per plot, three feet six inches apart. Applied fertilizer March 27. Rebedded on fertilizer with twelve-inch lister and planted. Thorough shallow cultivation was practiced. Plots 8, 9 and 10 were injured by disease, 8 and 10 being the worst. Bad stand on plots 8, 9, and 10 caused them to endure the drouth better and partially made up for the loss in stand.

Description of soils Nos. 7231-7232. Depth 0″-12″. Located eight miles west of Floresville, Wilson County, Texas. This is rolling land, and occurs as fine sandy loam ridges between two small branches. It is poor in fertility and not uniform. It produces one-fourth bale of cotton and fifteen bushels of corn per acre. Manure has been used on some of the land with a slight improvement. This is a brown sandy soil, known as "light post oak." It does not do well in wet seasons, but stands drouth well. It does not pack badly. Cotton dies, but not from root rot. The land had been cultivated for twenty-five or thirty years. The sample represents twenty acres or more of the farm, and ten per cent. of the county.

No. 7232. Depth 12″-24″. Subsoil to 7231. This is a light brown sandy soil.

DETAILS OF EXPERIMENTS—COTTON, 1913.

Willis Taylor, Palestine, Anderson County. Experiment 390. Five miles west of Palestine. Moderately good, uniform land. Produces twenty bushels of corn, one-third bale of cotton. In cultivation from ten to seventeen years. Upland and level. Dark sandy soil with clay subsoil. Good drainage. Land broken in December. Fertilizer has been used with good results. Cotton planted April 14, harvested September 15. Applied fertilizer in center furrow run after flat breaking. Two rows, three and one-half feet apart, and 560 feet long. All plots were flat broke, bedded, and cultivated just alike. Dry weather caused short crops.

Description of soils Nos. 7706-7707. Depth 0″-6″. Located at Palestine, Anderson County. These are gray upland sandy soils. One acre produces twenty bushels of corn or 600 pounds of cotton.

No. 7707. Depth 6″-12″. This is a subsoil to 7706. It is a yellowish gray sand.

Table 31.—Seed cotton per acre, 1913.

Laboratory No.		Nothing—1	Nothing—8	150 lbs. acid phosphate.	200 lbs. cottonseed meal.	150 lbs. acid phosphate, 100 lbs. cottonseed meal, 50 lbs. nitrate of soda.	150 lbs. acid phosphate, 200 lbs. cottonseed meal.	150 lbs. acid phosphate, 200 lbs. cottonseed meal, 20 lbs. sulphate of potash.	150 lbs. acid phosphate, 200 lbs. cottonseed meal, 50 lbs. sulphate of potash.	One load manure.	400 lbs. hydrated lime.	200 lbs. rock phosphate.	150 lbs. acid phosphate, 50 lbs. nitrate of soda, 100 lbs. cottonseed meal.
390	Willis Taylor, Anderson Co....	330	320	350	340	460	420	490	490	.....	330	.....	.....
391	L. O. Meadows, Bowie Co.....	300	520	360	360	390	420	450	450	490	390	.....	.....
392	L. W. Dirk, Brazoria Co.....	425	305	500	585	580	640	710	650	780	305	.....	.....
393	C. E. Carter, Cass Co.....	430	370	420	420	540	480	500	500	500	310	.....	.....
394	W. B. Hollingshead, Camp Co.	420	420	520	570	590	560	640	660	690	470	.....	.....
395	J. A. Hirst, Comanche Co.....	560	570	640	610	790	780	680	690	620	610	.....	.....
396	S. H. Baker, Comanche Co....	200	380	230	320	350	460	450	460	410	350	.....	.....
397	Fred Ohrt, DeWitt Co.....	....	....	740	880	840	900	890	870	.....	840	.....	.....
398	J. B. Mallard, Fall Co.....	600	590	680	690	640	710	800	860	1000	380	.....	.....
399	A. S. Van Kirk, Fannin Co...	560	630	690	560	700	670	800	820	580	570	.....	.....
400	W. O. Draper, Freestone Co...	460	480	580	590	630	610	640	680	600	500	.....	.....
401	H. F. Arnecke, Goliad Co.....	170	270	210	230	150	300	320	340	260	320	.....	.....
402	C. C. Schley, Hopkins Co.....	650	390	780	820	650	650	400	410	550	260	.....	.....
403	G. Z. Thompson, Hopkins Co.	660	1140	1080	1260	1380	1610	1570	1680	2220	.....	1390	.....
404	Geo. A. Nelson, McCullough Co.....	870	800	800	840	890	900	970	930	950	830	.....	.....
405	J. J. Cade, Milam Co.....	340	360	430	390	430	480	430	480	.....	.....	.....	.....
406	R. R. Hall, Rains Co.....	610	630	660	710	660	660	.....	620	690	.....	.....	.....
407	J. A. Patterson, Runnels Co...	290	360	310	350	340	340	310	400	360	320	.....	.....
408	A. H. Anderson, Travis Co....	700	650	690	720	700	720	670	780	610	690	.....	.....
409	J. C. Lambertson, Victoria Co.	1020	....	1620	1370	1610	.....	.....	.....	.....	1240	.....	1620
410	A. Ray, Victoria Co.....	700	720	600	670	740	740	770	700	1040	480	.....	.....
411	A. B. Binney, Walker Co.....	410	400	430	400	450	450	440	490	440	380	.....	.....
412	L. C. Lehman, Washington Co.	530	500	670	520	680	620	600	670	660	520	.....	.....
	Average.....	511	524	609	613	657	641	644	620	707	505	1390	1620

L. O. Meadows, DeKalb, Bowie County. Experiment 391. Four miles southeast of DeKalb. Moderately good, uniform land. Produces one-third bale of cotton per acre. In cultivation twelve or fifteen years. Has been laying out for some time. White, coarse sandy soil, with quicksand subsoil. Bad drainage. Land broken in January. Barnyard manure doubles yield first year but has no effect the second. Cotton planted May 10 and harvested in September. Fertilizer applied by hand. Five rows per plot, three and one-half feet apart, and 105 yards long. All plots cultivated alike. All plots injured by dry weather.

Description of soils Nos. 7619-7620. Depth 0″-6″. Located four miles southeast of DeKalb, Bowie County, Texas. Bennitt survey. This is upland soil, rolling, moderately fertile, though not uniform in fertility. The field sampled is a deep sandy ridge with some mounds and flats. One bale of cotton and thirty-six bushels of corn are produced per acre. No fertilizer or manure has been applied and no green crops have been plowed under. The soil is a yellow and gray sand which in wet seasons packs and runs together, forming a crust. On drying, part of the soil crumbles and part clods. It retains moisture and withstands drouth well. Plants do not produce good stalks and cotton dies in some places. The land has been under cultivation for fifteen years. The sample represents about two-thirds of the farm and about one-half of the county.

No. 7620. Depth 6″-18″. The soil is a yellow sand.

L. W. Dirks, Columbia, Brazoria County. Experiment 392. Eleven miles north of Columbia. Excellant land, quite uniform. Yields one-half bale of cotton. First year in cultivation. Previously pasture. Farm joins the Brazos river. Dark colored silt loam soil with clay to clayish loam subsoil. First class drainage. Broke land in November. No commercial fertilizers have been used. Cotton planted March 28, harvested from September 6 to October 22. Fertilizer applied by hand in furrow and covered with cultivator. Four rows, three feet apart per plot, and 280 feet long. Shallow cultivations at intervals of two weeks after each rain with a buzzard wing sweep. All plots damaged by weevils and worms. Plot 9 had best stand. Manure retained moisture. Dry weather produced bad stand.

C. E. Carter, Hughes Springs, Cass County. Experiment 393. Three miles east of Daingerfield. Moderately good, nearly uniform land. Produces 700 pounds seed cotton and twenty bushels corn. In cultivation eight years. Previously fertilized a few times but responded readily. Light sandy loam soil, with red clay subsoil occasionally running into gray sand. Good drainage. Breaks land first of December. Good results have been obtained from cottonseed meal, acid phosphate and mixed fertilizer. Cotton planted May 9, harvested from September 3 to November 1. Applied fertilizer with one-horse distributer. Four rows per plot, four feet apart and 280 feet long. Flat broken with two-horse "Kelly" plow February 26, six inches deep, cultivated shallow with sweep. Dry weather and hot winds injured all plots.

Description of soils Nos. 7167-7168. Depth 0″-12″. Located three miles northeast of Daingerfield, Cass County, Texas. Bratten survey. This is upland, somewhat rolling, and considered of moderate fertility. It produces 500 to 1,000 pounds of seed cotton per acre, and twenty to forty bushels of corn per acre. Last year 200 pounds per acre of meal and phosphate was applied with good results. No manure has been applied and green crops have been plowed under. The soil is a gray sand, locally known as the "sandy loam." The drainage is good. No season has ever been so wet as to affect the yield sensibly. Cotton throws off and corn fires from short drouths. The soil does not pack badly, it runs together to some extent, clods very little, and dries to crumbs. Plants produce good stalks. Very little cotton dies. The land has been cultivated about seven or eight years, and has been clean for ten years. The sample represents sixteen acres of the farm and fifty per cent. of the county.

No. 7168. Depth 7″-19″. Subsoil to 7167. This is a pinkish white soil.

W. B. Hollingshead, Pittsburg, Camp County. Experiment 394. Southeast of Winnsboro. Uniform land, produces 700 pounds seed cotton. In cultivation thirty or forty years. Previously an orchard. Almost level land. Light loam soil with yellow sand subsoil, eighteen inches, then red clay. Good drainage. Land broken in February. Commercial fertilizer has been used but not in sufficient quantities to

make a difference noticeable. Cotton planted April 25 and harvested October 13 and 17. Fertilizer applied directly under plants. Four rows per plot, forty-two inches apart and 234 feet long. Land broken March 24. Fertilizer applied April 7, cotton planted April 25, thinned to stand May 23. Weevils and dry weather damaged all plots at least twenty-five per cent.

Description of soils Nos. 7169-7170. Depth 0″-6″. Located twelve miles southeast of Winsboro, Upshur County, Texas. The land is upland, level with small knolls, and moderate in fertility. It produces 400 to 700 pounds of cotton. In 1908 a moderate crop of oats was made. One hundred pounds of fertilizer improved the stalks but caused injury in dry weather. Manure has been used with good results. The soil is a gray sand, which works and produces better in wet years. In dry seasons the soil becomes hard and the yield is poor. It packs and runs together in places, and dries to crumbs. Cotton stalks are eighteen inches high. The land has been cultivated twenty-five to thirty years. The sample represents the entire farm, and a large portion of the county.

No. 7170. Depth 6″-18″. Subsoil to 7169. This soil is a yellow sand.

J. A. Hirst, DeLeon, Comanche County. Experiment 395. Two miles east of Gorman. Moderately good land. Uniform. Produces twenty bushels corn, one-third bale of cotton. In cultivation seven years. Previous to this was timber land. Upland, dark sandy loam, with yellowish subsoil. Good drainage. Land broken in February. Never used commercial fertilizer before. Planted cotton April 19. Fertilizer applied by hand in deep furrow. Four rows, three and one-half feet apart, and 128 yards long. Cotton thinned and plowed May 23. Hoed and cultivated June 17, cultivated again June 27 and July 8. Middles run out July 11. All plots suffered from rain and weevils.

Description of soils Nos. 7241-7242. Depth 0″-7″. Located three and one-half miles east and three-fourths mile north of Gorman, Comanche County, W. M. DeMoss survey. This is upland and a little rolling. Thirteen acres are just rolling enough to drain well; drains to east and south. It produces one-third bale of cotton and fifteen to twenty bushels of corn per acre. No fertilizer except under crop test. No manure applied until this year. Drains well in wet seasons. When fresh, does not resist drouth well. Soil is grayish brown sand, packs in places and runs together, and forms a crust on drying. Plants produce good stalks. Cotton does not die. Under cultivation seven years.

No. 7242. Subsoil to 7241. Depth 7″-19″. This soil is a yellow sand.

S. H. Baker, DeLeon, Comanche County. Experiment 396. Five miles east of DeLeon. Good, uniform land. Produces sixty bushels of corn per acre. Five years in cultivation. First bottom land. Dark loam soil with clay subsoil. Good drainage. Has never used fertilizer. Cotton planted May 29. Applied fertilizer by hand. Two rows per plot, three

and one-half feet apart and 210 yards long. Crops badly injured by boll weevils.

Fred Ohrt, Cuero, DeWitt County. Experiment 397. Fourteen miles south of Cuero. Land good. Spotted. Produces two-thirds bale of cotton and thirty-five to forty bushels of corn. In cultivation twenty-four years. First bottom land. Heavy black waxy land. Fair drainage. Breaks land in January. Cotton planted March 27, harvested August 27. Applied fertilizer by hand. Four rows, three and one-half feet apart, and 270 feet long. Plot 1 was retarded by corn growing beside it.

J. B. Mallard, Rosebud, Falls County. Experiment 398. Four miles east of Travis. Land uniform and moderately good. Produces one-third bale of cotton and twenty-five bushels of corn. In cultivation twelve years. Previously was covered with black jack oaks and Spanish mulberries. Upland, dark sandy loam with red clay subsoil. Excellent drainage. Land broken December 1. Used cottonseed meal with good results. Land planted to cotton made 1300 pounds seed cotton. Cotton planted April 10, harvested October 15. Applied fertilizer by hand. All plots were plowed three times and hoed twice.

A. S. Van Kirk, Bonham, Fannin County. Experiment 399. One mile north of Bonham. Poor uniform soil. Produces one-fourth bale of cotton. In cultivation thirty years. Never very productive. Upland gray tight land with some sand and a blue clay subsoil. Planted cotton April 25. Applied fertilizer in furrow and bedded upon it. Four rows, three feet and ten inches apart per plot, and 135 yards long. Land broken March 1, fertilized April 11. Cultivated shallow and maintained mulch until August 1. All plots were injured by lice and boll worm.

Description of soils Nos. 7229-7230. Depth 0″-8″. Located at Bonham, Fannin County. This is a grayish brown, poor loam soil, locally called "sandy," upland and rolling. The soil packs, runs together, and cements when dry, but does not crumble. It has been in cultivation for thirty years. Used a fertilizer in 1909 with a gain of one-third. Manure, also, when applied to truck farming, shows up well. No green manure has been used. One acre produces 250 pounds seed cotton.

No. 7230. Depth 8″-20″. This is a subsoil to 7229. It is a poor dark brown, clay loam soil.

W. O. Draper, Streetman, Freestone County. Experiment 400. Three miles northeast of Kirvin. Moderately good land, reasonably uniform. Produces ten bushels of corn and one-third bale of cotton. In cultivation probably forty years. Almost level upland. Light sandy soil with red clay subsoil. Drainage not good. Land broken in December. Fertilizer used with no profit. Planted cotton May 6, harvested September 30. Fertilizer applied with distributer. Two rows, 3 feet apart per plot, and 242 yards long. Land bedded three times and cotton cultivated four times. Fertilized plots did well until drouth set in, and they made little afterwards.

Description of soils Nos. 7256-7257. Depth 0″-8″. Located about three miles northeast of Kirvin, Freestone County. This is upland soil, slightly rolling, and is considered moderate in fertility. The field is almost level. The fertility is uniform except in a few little spots. Last year five bushels of corn per acre were produced. No fertilizer or manure has been applied. The soil is a light brown sandy loam. It has not been cultivated in wet seasons. The owner believes it would not do well in wet seasons, but could stand ordinary dry seasons very well. With heavy rains the soil packs and runs together. It clods on drying. Plants do not produce an extra good stalk. Cotton does not die. The land has been cultivated about forty years. The sample represents about twenty-five acres of the farm. No green crops have ever been plowed under.

No. 7257. Depth 8″-18″. Subsoil to 7256. This is a light brown sandy loam.

Henry F. Arnecke, Goliad, Goliad County. Experiment 401. Nine miles north of Goliad. Land mixed but moderately good. Produces twenty bushels of corn per acre. In cultivation four years. Upland, dark sandy soil with clay subsoil. Good drainage. Cotton planted April 2-13. Fertilizer distributed in furrow by hand. Four rows, three feet four inches apart per plot, and 280 feet long. Cultivated with eight-inch sweeps and afterwards harrowed. All plots damaged by weevils and drouth and frequent June showers.

Description of soils Nos. 7175-7176. Depth 0″-6″. Located ten miles north of Goliad, Goliad County, Sal Griffin survey. This is hilly upland of moderate fertility. It is mixed land, sandy, black and some flat. It produces 500 pounds of seed cotton and twenty bushels of corn per acre. No fertilizer has been applied. About eight two-horse loads of manure have been applied with good results. The soil is a black sand which bogs in wet seasons, and will form a crust in dry weather if not cultivated. Crops do not do well in wet seasons, but give a fair yield in dry years. The soil packs, runs together, and clods to some extent. It does not crumble. Plants produce a fair stalk. Cotton dies in places. The land has been cultivated for from one to five years. The sample represents about fifteen acres.

No. 7176. Depth 6″-18″. Subsoil to 7175. This is a black mottled with yellow and brown sandy clay.

C. C. Schley, Sulphur Springs, Hopkins County. Experiment 402. Two miles south of Sulphur Springs. Good uniform land. Produces three-fourths bale of cotton. In cultivation eight years. In peach orchard previously. Upland, dark sandy loam with sandy clay subsoil. Good drainage. Breaks land in January. Never used commercial fertilizer. Planted cotton May 15. Applied fertilizer by hand. Five rows, four feet apart per plot, and 217 feet long. Cultivated four times and hoed three. All plots were injured by leaf worms. Plot 10 was near the woods. Plot 8 was injured by Bermuda grass growing on end of plot. Damaged about eight per cent.

G. Z. Thompson, Sulphur Springs, Hopkins County. Experiment 403. Two miles south of Sulphur Springs. Moderately good land. Uniform. Produces twenty bushels of corn. In cultivation fifteen years. Second bottom land. Dark sandy loam with red clay subsoil. Drainage moderate. Cotton planted April 21. Applied fertilizer by hand. Four rows, three and one-half feet apart per plot, and 312 feet long. Cultivated every eight to ten days. Used cultivator six times.

George A. Nelson, Brady, McCulloch County. Experiment 404. Three miles northeast of Brady. Moderately good spotted land. Produces twenty-five to thirty bushels of oats. Upland. Dark loam soil with a kind of "chalk" subsoil. Land broken flat in October. Never used fertilizer. Planted cotton April 20, harvested August 19 and October 5. Fertilized by hand. Two rows, three feet apart to the plot, and 630 feet long.

J. J. Cade, Cameron, Milam County. Experiment 405. One-half mile west of Cameron. Moderately good, uniform land. Produces one-fourth bale of cotton, fifteen bushels of corn. In cultivation fifty years. Upland, dark, sandy soil, with red clay subsoil. Good drainage. Breaks land in December. Planted cotton April 28, harvested September 22. Fertilizer drilled in before planting. Two rows per plot, three feet apart, and 226 yards long. All plots cultivated well. Forty per cent. was destroyed by rain and wind.

Description of soils Nos. 7120-7121. Depth 0"-12". Located one-third mile from Cameron, Milam County, Pettibone survey. This is upland soil, known as "mixed soil," and is not uniform in fertility. It produces one-third bale of cotton and fifteen bushels of corn per acre. The soil is brown and reddish brown sandy clay, which cracks in dry seasons. Grass grows luxuriously in dry seasons and fairly well in wet seasons. The soil packs, runs together and clods on drying. Plants produce a good stalk. Cotton does not die. The land has been under cultivation for fifty years. The sample represents one-third of the sixty-acre farm.

No. 7121. Depth 12"-24". Subsoil to 7120. This is a brown and black mottled clay.

B. R. Hall, Emory, Rains County. Experiment 406. Good, uniform land. Produces one-half to three-fourths bale of cotton. Several years in cultivation. Upland, light sandy soil with clay subsoil and fairly good drainage.

J. A. Patterson, Ballinger, Runnels County. Experiment 407. Seven miles north of Ballinger. Fairly good, uniform land. Produces one-third bale of cotton and one-half ton maize. In cultivation five years. Upland, dark gray soil. Breaks land in December. Never used fertilizer. Cotton planted May 12 and harvested September 17. Fertilizer applied in deep furrow with walking distributer. Five rows, three feet apart to each plot, and ninety-eight yards long. Harrowed twice, cultivated three times, hoed once. Season very dry. Water collected from roads on plots 7, 8, and 9.

Description of soils Nos. 7355-7356. Depth 0″-6″. Located one and one-eighth miles south of Hatchet, Runnels County, known as the G. B. Nixon farm. This is rather level upland, and is considered of good fertility. The average production is one-fourth bale of cotton and 1000 pounds of milo per acre. No fertilizer or manure has been applied, and no green crops have been plowed under. The soil is a black sandy loam. In wet seasons it produces three-fourths bale of cotton and 2000 or more pounds of milo per acre, but in dry seasons does not produce much. Plants produce good stalks in wet seasons. Cotton does not die. The soil runs together, but crumbles on drying. The land has been under cultivation for seven years. The sample represents 100 acres of the farm.

No. 7356. Depth 6″-16″. Subsoil to 7355. This is a dark brown clay loam.

A. H. Anderson, Manor, Travis County. Experiment 408. Four miles west of Manor. Good, uniform land, produces 800 pounds seed cotton and thirty-five bushels corn. In cultivation thirty years, making good average crops. Upland, black soil, with clay subsoil, and good drainage. Cotton planted April 12, harvested August 17 and October 24. Fertilizer applied in opening furrow and bedded on top. One row per plot, three feet apart, and 480 yards long. Cultivated five times with four-shovel cultivator and twice with one-horse harrow.

Description of soils Nos. 7145-7146. Depth 0″-12″. Located four miles west of Manor, Travis County, Lucas Manor survey. This is upland soil, very level and uniform, and considered of moderate fertility. It produces one-half bale of cotton and thirty bushels of corn per acre. No fertilizer or manure has been applied, and no green crops have been plowed under. The soil is a black clay called "black waxy," which does not pack, run together, or clod. Plants produce good stalks. Cotton does not die. The land has been cultivated for thirty years. No green crops have ever been plowed under. The sample represents 120 acres of the farm.

No. 7146. Depth 12″-24″. Subsoil to 7145. This soil is a black heavy clay.

J. C. Lambertson, Fordtran, Victoria County. Experiment 409. Thirteen miles east of Thomaston. Moderately good, uniform land, producing twenty-five to thirty bushels of corn. In cultivation three years. Previously an old field. Upland, gray sandy soil with red clay subsoil. Good drainage. Land broken in January. Various brands of fertilizer used with varying results. Cotton planted April 15 and harvested October 10. Applied fertilizer in drill. Four rows, four feet apart in plots, and 280 feet long. Chopped to twenty-inch stand. Cultivated four times and hoed twice. Storm wasted nearly one-half of the crop on all plots.

Description of soils Nos. 7091-7092. Depth 0″-12″. Located twelve miles northeast of Thomaston, Victoria County, Simon Cockell survey. This is upland soil, a little rolling. It is moderate and uniform in

fertility. It produces twenty-five to thirty-five bushels of corn per acre. In 1912 200 pounds of commercial fertilizer was applied, with a slight increase of crops. One load of manure in 1912 was applied with fair increase of crops. The soil is gray sand mixed with clay. It is well drained. The soil packs in a few places, does not run together much, does not clod, and crumbles on drying. Plants produce a very large stalk. Cotton does not die. The land has been under cultivation for three years. No green crops have ever been plowed under. The sample represents three acres of the farm.

No. 7092. Depth 0″-12″. Subsoil to 7091. This is a reddish gray clay and sand.

A. Ray, Victoria, Victoria County. Experiment 410. Twelve miles east of Victoria. Good, uniform soil, produces one-half bale of cotton, thirty to forty-five bushels of corn, in cultivation seventeen years, previously ranch land. Upland, black clay soil with yellow clay subsoil, and good drainage. Used 10-2-2 fertilizer with marked results. Planted cotton March 20. Fertilizer applied with fertilizer attachment in furrow, then covered with opener. Four rows two feet ten inches apart per plot, and 138 yards long. Fertilizer applied and land rebedded February 20 and cotton planted March 20. Cultivated five times. Chopped to stand April 2. Dry weather cut off practically three-fourths of the crop.

A. B. Binney, Huntsville, Walker County. Experiment 411. Eleven miles south of Huntsville. Poor, uniform soil. Produces one-fourth bale of cotton per acre. In cultivation sixty years. Upland, light sandy soil with sandy subsoil. Very good drainage. Fertilizer used several times with fair results. Planted cotton April 19, harvested September 15. Applied fertilizer with riding planter. Five rows, three feet apart per plot and ninety-seven yards long. All plots were flat broken and cultivated shallow. Dry weather damaged all plots.

Description of soils Nos. 7252-7253. Depth 0″-5″. Located ten miles south of Huntsville, Walker County. This is upland soil, and is considered poor. It is uniform in fertility. It produces about one half bale of cotton per acre. About 300 pounds of cottonseed meal per acre have been applied with fairly good results. The soil is a white sand which packs and runs together. Plants do not produce good stalks. Cotton dies. The sample represents one-third of the farm.

No. 7253. Depth 5″-17″. Subsoil to 7252. This soil is a white sand.

L. C. Lehmann, Brenham, Washington County. Experiment 412. Five miles west of Brenham. Land moderately good and uniform. Produces thirty to thirty-five bushels of corn, one-third to one-half bale of cotton. In cultivation thirty years, previously post oak and prairie land. Upland, black soil with light subsoil. Fair drainage. Land broken in December. Used barnyard manure with good results. Cotton planted April 15. Fertilizer applied by hand and mixed into soil by dragging with a chain. Three rows, three feet apart per plot, and

378 feet long. All plots damaged by weevils. All plots harrowed once, hoed twice, cultivated with a cultivator three times. Rain was light.

Description of soils Nos. 7339-7340. Depth 0″-8″. Located five miles west of Brenham, Washington County, Isaac Jamison survey. This is level rolling upland, of fair fertility, but not uniform. It produces one-third bale of cotton and thirty bushels of corn per acre. Barnyard manure has been used on thin spots with good results. The soil is a black clay, which runs together after hard rains, and cracks open in dry seasons. Plants produce a fair stalk. Cotton dies in spots in some years. The land has been under cultivation for about thirty years. The sample represents about two-thirds of the farm.

No. 7340. Depth 8″-15″. Subsoil to 7339. This is a black clay.

DETAILS OF EXPERIMENTS—COTTON, 1914.

R. P. Copeland, Route 2, Red Rock, Bastrop County. Experiment 413. This is a poor soil, located three miles southeast of Dale. It was first cultivated twenty-five years ago and was good land then. It is a hilly, sandy, uniform soil with a red clay subsoil. The cotton was planted May 9 on plots of four rows each, three feet apart, and 120 yards long. The land was broken January 9, harrowed February 18, bedded March 11, fertilizer put down April 12, and plowed May 30, June 6, and June 10. Plot 3 had the best stand. Crop had to be planted over, therefore the fertilizer was put in the ground some time before the crop was planted.

Table 32.—Yield of seed cotton in pounds per acre, 1914.

Laboratory No.		Nothing—0	Nothing—0	150 lbs. acid phosphate.	200 lbs. cottonseed meal.	150 lbs. acid phosphate, 100 lbs. cottonseed meal, 50 lbs. nitrate of soda.	150 lbs phosphoric acid, 200 lbs. cottonseed meal.	150 lbs. phosphoric acid, 200 lbs. cottonseed meal, 201bs. sulphate of potash.	150 lbs. phosphoric acid, 200 lbs. cottonseed meal, 50 lbs. sulphate of potash.	10 loads manure.	One load manure, 150 lbs. phosphoric acid.
413	R. P. Copeland, Bastrop Co.	280	280	350	380	470	430	380	380	290	330
414	W. H. Deviney, Caldwell Co.	320	370	320	340	400	380	360	410	420	380
415	J. E. Freeman, Camp Co.	480	460	740	720	770	810	680	600	680	730
416	I. H. Davidson, Cass Co.	360	360	500	600	700	660	720	750	520	400
417	Wm. Manton, Clay Co.	280	280	320	180	260	240	220	280	180	280
418	J. B. Hobson, Denton Co.	1440	1450	1410	1400	1230	1610	1450	1470	1290	1220
419	W. M. Tate, Denton Co.	680	850	730	800	820	840	840	920	920	1000
420	Jno. H. Smith, Erath Co.	340	350	440	350	430	460	428	430	400	480
421	J. B. Winters, Erath Co.	1190	1200	1350	1300	1450	1450	1510	1550	1500	1600
422	Rodger Davis, Franklin Co.	230	160	320	330	400	370	410	410	.....	300
423	Jim Payne, Franklin Co.	190	250	240	290	290	320	370	370	410	430
424	J. V. Finley, Grayson Co.	210	.....	330	230	250	.....	210	350	480	540
425	F. M. McGlothlin, Grayson Co.	460	265	395	375	380	320	350	380	560	465
426	James F. Dorris, Gregg Co.	560	590	660	830	720	870	820	880	650	690
427	Dennie Walsh, Harris Co.	1650	1250	1610	1490	1350	1480	1290	1440	1400	1490
428	Allen Bell, Henderson Co.	730	1040	690	970	1030	1050	1110	1330	1350	1010
429	F. M. Goodell, Henderson Co.	540	500	690	550	630	570	630	670	510	710
430	L. B. Mason, Henderson Co.	620	590	720	720	650	820	710	780	940	880
431	M. A. Groom, Hood County	320	500	540	550	510	550	600	600	.....	.....
432	J. M. Hendrix, Hood Co.	590	610	710	680	690	700	700	680	.....	.....
433	D. E. Thomas, Houston Co.	270	260	350	410	460	430	450	470	410	510
434	W. D. Phillips, Jasper Co.	610	600	720	580	570	750	840	810	1120	1190
435	A. W. West, Jasper Co.	360	300	390	420	460	430	480	460	560	790

Table 32—Yield of seed cotton in pounds per acre, 1914—Continued.

Laboratory No.		Nothing—0	Nothing—0	150 lbs. acid phosphate.	200 lbs. cottonseed meal.	150 lbs. acid phosphate, 100 lbs. cottonseed meal, 50 lbs. nitrate of soda.	150 lbs phosphoric acid, 200 lbs. cottonseed meal.	150 lbs. phosphoric acid, 200 lbs. cottonseed meal, 20 lbs. sulphate of potash.	150 lbs. phosphoric acid, 200 lbs. cottonseed meal, 50 lbs. sulphate of potash.	10 loads manure.	One load manure, 150 lbs. phosphoric acid.
436	R. L. Newsom, Johnson Co.	300	.....	700	690	930	930	970	1070	650	790
437	H. A. McDaniel, Leon Co.	300	310	350	320	370	400	390	450	380	350
438	J. P. Webb, Lubbock Co.	1500	1520	1720	1750	1910	1820	1870	1970	1780	1880
439	Thos. Walker, Morris Co.	600	800	700	1000	1250	1650	1650	1700	2550	2650
440	Joseph Watson, Nueces Co.	700	450	910	660	770	650	620	580	660	550
441	G. A. Bradley, Parker Co.	1020	870	990	1000	910	830	830	890	810	800
442	R. R. Hall, Rains Co.	1270	700	1450	1290	1290	1090	790	850	700	740
443	J. R. Nalley, Robertson Co.	330	310	360	380	390	370	400	410	610	580
444	L. B. James, Runnels Co.	2230	2450	2450	2240	2600	2690	2700	2800	2550	2560
445	O. J. Berry, Rusk Co.	580	530	660	820	810	830	920	820	890	770
446	M. Law, Rusk Co.	800	850	650	900	780	1000	1050	1100	1090	1200
447	E. J. McGowan, Sabine Co.	410	500	505	515	570	580	640	640	610	600
448	J. L. McAdams, San Jacinto Co.	.....	580	920	740	890	750	720	710	650	780
449	J. S. Hale, Smith Co.	810	630	950	870	1090	900	940	950	780	880
450	J. W. Malone, Smith Co.	750	900	750	750	750	800	800	800	950	950
451	A. R. Ivey, Titus Co.	220	170	290	200	210	210	260	290	320	280
452	Ben Berke, Jr., Trinity Co.	1740	2150	2220	2210	2480	2410	2400	2640	2340	2410
453	R. N. W. Smith, Upshur Co.	1000	.....	1060	1040	1040	1000	1030	1000	.....	.....
454	J. M. Anders, Van Zandt Co.	700	870	1370	1000	1080	1140	1210	1400	900	122
455	W. J. Gardner, Van Zandt Co.	520	470	780	660	730	840	840	930	710	770
456	W. McDermitt, Washington Co.	260	290	335	275	290	240	400	430	250	280
457	W. H. Wedemeyer, Washington Co.	680	600	750	840	970	880	950	980	810	730
458	F. M. McCollum, Grayson Co.	500	.....	2050	400	1750	2000	.....	.....	.....	.....
	Average	669	677	798	770	812	854	843	885	853	846

W. H. Deviney, Route 5, Lockhart, Caldwell County. Experiment 414. This plot is located six miles east of Lockhart on poor, spotted, well drained, upland, dark sand and red clay soil. No fertilizer has ever been used on this land, but it produces about 150 to 200 pounds of cotton per acre. The plots are five rows each, three feet apart, and ninety-seven yards long. The land was broken up, bedded, and fertilizer applied with a corn planter ten days before the cotton was planted, April 15. Plots 7, 8, 9, and 10 had to be replanted May 3 on account of heavy rains. Too much rain made the experiment unsatisfactory.

J. E. Freeman, Pittsburg, Camp County. Experiment 415. This plot is located two miles east of Pittsburg on well drained, good, uniform, upland, light sandy soil with yellow clay subsoil. The land has been under cultivation twenty or thirty years, has had several kinds of fertilizers applied, and yields about twenty-five bushels of corn or one-half bale of cotton without fertilizer. Cottonseed meal and acid phosphate have given better results than other fertilizers. The plots are four rows each, four feet apart, and 280 feet long. All plots were damaged alike by leaf worm and wet weather.

I. H. Davidson, Atlanta, Cass County. Experiment 416. This plot is located four miles west of Atlanta on well drained, uniform, moderately fertile, upland, yellow sandy soil with clay subsoil. The land has been under cultivation about thirty years; has had fertilizer ap-

plied with good results, and produces about 500 pounds of cotton or eight bushels of corn per acre. Plots are of three rows each, three and one-half feet apart, and 150 yards long. Cotton was planted May 15 and harvested before November 1. All plots were damaged alike by dry weather immediately after planting.

William J. Manton, Route 2, Bellevue, Clay County. Experiment 417. Plot is located three and one-half miles southeast of Bellevue on well drained, level upland, uniform, moderately fertile, dark sandy soil with red clay subsoil. Land has been under cultivation about twenty-five years, has never had any commercial fertilizer applied to it. It produces about twenty-five bushels of corn or one-fifth bale of cotton per acre. The cotton was planted on plots of ten rows each, three and one-third feet apart, and 132 feet long. The cotton was not planted until about four weeks after the fertilizer was applied on account of heavy rains in the spring. The heavy rains in spring and dry weather later in summer made conditions unfavorable for fertilizer to give the best results.

Description of soils Nos. 9380-9381. Depth 0″-4″ or 11″. Located four miles southeast of Bellevue, Clay County. The soil is moderately fertile. It is locally called "part sandy." It behaves well in wet seasons; badly in dry seasons. It has been under cultivation for twenty-seven years and no fertilizer or manure has been applied. Soil does not pack or crumble, but runs together and clods on drying. Plants produce good stalks. Cotton does not die. The sample represents twenty acres of the farm.

No. 9381. Depth 4″-16″ or 20″; or 11″-23″ or 27″. This is a subsoil to 9380.

J. B. Hobson, Route 2, Denton, Denton County. Experiment 418. The plot is located three miles south of Denton on fairly well drained, uniform, fertile, level, upland, heavy, sandy soil. The land has been under cultivation for about seven years. Fertilizer has given good results on adjoining lands. It produces about thirty-five bushels of corn per acre or one and one-half tons of millet. The cotton was planted on plots of three rows each, three and one-half feet apart, and 305 feet long. The land was well prepared and the cotton was planted May 19 and well cultivated. Plot 10 was damaged by being by a public road. Plots 5, 6, and 7 made slightly larger plants than others.

W. M. Tate, Route 2, Denton, Denton County. Experiment 419. Located three miles southwest of Denton on well drained, upland, fertile, uniform, dark loamy soil with light clay subsoil. The land has been under cultivation for about thirty years. Land yields one-third bale of cotton or twenty bushels of corn per acre without fertilizer. Plots were of two rows each, three and one-third feet apart, and 218 yards long. All plots were affected alike. The land is level and the high yield of plot 8 as compared with plot 2 is unaccounted for.

John H. Smith, Dublin, Erath County. Experiment 420. The plot is located two and one-half miles south of Dublin on fairly well drained, upland, uniform, moderately fertile, dark sandy soil with red subsoil. It has been under cultivation fifteen years, being planted thirteen years in cotton and two years in corn. No fertilizers have ever been tried, but it produces one-third bale of cotton or twenty bushels of corn per acre. The plots are of four rows each, three and one-half feet apart, and 320 feet long. The fertilizer was applied in open furrows April 20, but on account of rains the cotton was not planted until the 5th of June. All plots were damaged alike by rains and weevils. Other cotton planted earlier in the season did better.

J. B. Winters, Route 3, Stephenville, Erath County. Experiment 421. The plot is located one-half mile southeast of Stephenville on well drained, fertile, uniform, level, upland, dark sandy soil with red clay subsoil. It has been under cultivation fifteen years and produces one-half bale of cotton per acre. The cotton was planted May 12 on plots of four rows each, three and one-fourth feet apart, and 280 feet long. The fertilizer was applied nearly a month before the cotton was planted and may have been partly washed away by the heavy rains. All plots were damaged about equally by rains and weevils.

Rodger Davis, Route 2, Mount Vernon, Franklin County. Experiment 422. The plot is located five miles south of Mount Vernon on well drained, uniform, fertile, level upland, dark loamy soil with clay subsoil. Fertilizers have been used with good results. The land has been under cultivation fifteen years and produces thirty bushels of corn per acre or one-half bale of cotton. Plots are of three rows each, three and one-half feet apart, and seventy yards long. All plots were damaged by wet and dry weather. The large difference in the yield of plots 1 and 8 cannot be accounted for.

Description of soils Nos. 9183-9184. Depth 0″-12″. Located five miles south of Mount Vernon, Franklin County. This is a yellow sandy clay of moderate and uniform fertility. The situation is upland, slightly rolling, in timbered region. In wet seasons soil pulverizes well and makes very good yield, as well as in dry seasons. The soil does not pack together or clod, but crumbles on drying. It has been cultivated for fourteen years. Usually 200 pounds fertilizer to the acre has been used with good effect; however, 200 pounds to one-half acre were used this year. Manure also gave good results. The plants produce a medium stalk and cotton does not die. The sample represents 100 acres of the field and fifty per cent of the county. One acre produces one-fourth to three-fourths bale cotton.

No. 9184. Depth 12″-24″. This is a subsoil to 9183. It is a yellow clay.

Jim Payne, Hagansport, Franklin County. Experiment 423. The plot is located twelve miles north of Mount Vernon on well drained, poor, uniform, upland prairie, dark gray sandy soil with clay subsoil. It has been under cultivation three years, but has never had an ap-

plication of fertilizer. It yields ten bushels of corn or 500 pounds seed cotton per acre. The plots are twenty rows each, three feet apart, and 200 yards long. All plots had equal chances.

J. V. Findley, Gordonsville, Grayson County. Experiment 424. The plot is located at Gordonsville on well drained, valley, uniform, sandy soil with yellow clay subsoil. The land has been under cultivation eighteen years, has never had an application of fertilizer, and yields about one-fourth bale of cotton per acre. All plots were damaged by dry weather.

F. M. McGlothlin, Route 1, Denison, Grayson County. Experiment 425. Plot is located five miles east of Denison on well drained, uniform, moderately fertile, upland, deep sandy soil with yellow clay subsoil. Land has probably been under cultivation twenty years. It has had barnyard manure applied on it with good results, and produces from one-third to one-half bale of cotton per acre. The plots are four rows each, three feet apart, and 121 yards long. The cotton was planted May 6 and was cultivated five times with a plow and two times with a hoe. Plot 9 matured all bolls while others, especially plot 10, had a number of green bolls that never matured. Those plots having large amounts of nitrogen applied were damaged most by wet weather.

James F. Dorris, Route 3, Kilgore, Gregg County. Experiment 426. Plot is located four miles north of Overton on well drained rolling upland, poor, uniform, light red sandy soil with dark red subsoil. The land has been under cultivation for fifty years, has never had fertilizer applied to it, and produces fifteen bushels of corn or 500 pounds of seed cotton per acre. The cotton was planted May 4 on plots of six rows each, three feet apart, and eighty yards long. All plots had an equal chance. The total produce on the acre was 727 pounds, while the same plot had been producing 500 pounds before fertilizer was used.

Dennis Walsh, Addicks, Harris County. Experiment 427. The plot is located eighteen miles west of Houston on well drained, moderately fertile, spotted, second bottom, sandy loam, with red clay subsoil. The land has been under cultivation twenty-five years. It was formerly timbered with post oaks. No fertilizers have been applied. It produces one-half bale of cotton per acre. Cotton was planted April 17 on plots of three rows each, three and one-half feet apart. All were under the same conditions, but plots 3 and 8 turned yellow for some cause.

Allan Bell, Route 3, Athens, Henderson County. Experiment 428. The plots are located five miles north of Athens on moderately fertile, uniform, sandy soil with clay subsoil. The land has been under cultivation for ten years; has never had an application of fertilizer, and produces one-half bale of cotton or twenty bushels of corn per acre. Plots were of five rows each, and three and one-half feet apart. The fertilizer was applied about one month before the cotton was planted.

Plots had the same treatment except plots 1, 2, and 3, which were not worked out until late. The rainfall was too great for a satisfactory test of the fertilizers.

Description of soils Nos. 9271-9272. Depth 0″-6″. Located five miles from Athens, Henderson County. The fertility is moderate and not quite uniform. The situation is upland. It is locally called "sand." The soil packs, runs together, crumbles, and clods on drying. Its nature is principally wet. It has been cultivated from one to two years, but this is the first crop. Plants do not produce good stalks.

No. 9272. Depth 6″-18″. This is a subsoil to 9271.

F. M. Goodell, Route 1, Eustace, Henderson County. Experiment 429. The cotton was planted April 10 on plots of two rows each, three and three-fourths feet apart, and 180 yards long. All plots suffered from unfavorable weather conditions. Plots 1 and 8 suffered most from wet weather, but grew longer after the drouth began, while plots 3 and 9 suffered most from drouth.

Description of soils Nos. 9179-9180. Depth 0″-6″. Located one mile south of Eustace, Henderson County, Section 69, J. M. Beltram survey. This is a brown fertile soil with a gradual slope north. The drainage is good, but the soil washes. It is locally known as "tight sand." The field has a clay swag running east and west. The soil holds moisture well in dry seasons if well mulched. It packs and crumbles on drying. It has been cultivated eight years, and manure when added gave good results. Twenty pounds acid phosphate in 1912 and 1913 gave good results also. Some peas have been plowed under, but mostly dry material has been plowed under. The plants produce good stalks, and cotton does not die. The sample represents three-fourths of the field and about one-half of the county. One acre produces thirty-six bushels corn.

No. 9180. Depth 6″-18″. This is a subsoil to 9179. It is a yellowish red clay.

L. R. Mason, LaRue, Henderson County. Experiment 430. Plots are located one and one-half miles southwest of LaRue on well drained, uniform, moderately fertile, upland, light sandy soil with reddish brown subsoil. This land has been under cultivation for about twenty-five years and is steadily declining in yields except for the use of barnyard manure, which has given good results. The plots are of four rows each, four feet apart, and 280 feet long. Excessive rainfall at planting time caused a three weeks' delay in planting crop, and a seventy-day drouth caused a serious damage to the yields of the crops.

M. A. Groom, Route 3, Granbury, Hood County. Experiment 431. Plot is located six miles southwest of Granbury on well drained, uniform, moderately fertile, upland, light sandy loam soil with red clay subsoil. This land has been under cultivation for twelve years, has never had an application of commercial fertilizer, and produces one-third bale of cotton per acre. The cotton was planted June 12 on plots of four rows each, three and one-half feet apart, and 280 feet

long. All plots were damaged by insects, but plots 4, 5, 6, and 7 seemed to suffer most. Plot 1 was damaged slightly by an adjoining watermelon patch.

J. M. Hendrix, Route 1, Lipan, Hood County. Experiment 432. Plot is situated nine miles south of Santo on well drained, good, mixed bottom, dark colored soil with light red subsoil. It has been under cultivation for nine years and produces one-sixth to one bale of cotton or from none to fifty bushels of corn per acre. The land is subject to overflow. No fertilizer has ever been applied to this land before. The cotton was planted April 10 on plots of one row each, three feet apart, and 420 yards long. Plot 2 had no fertilizer applied to it, and plot 1 was damaged by rabbits.

D. E. Thomas, Route 2, Kennard, Houston County. Experiment 433. Plots were of two rows each, four feet apart, and ninety-two yards long, located ten miles south of Ratcliff on well drained, uniform, moderately fertile, upland, light yellow loamy soil with rocky subsoil. The land has been under cultivation eight years, and has had acid phosphate and cottonseed meal applied to it with good results. It yields one-half bale of cotton per acre. All plots were worked alike and suffered or were profited by the same natural conditions.

W. D. Phillips, Bessmay, Jasper County. Experiment 434. The plots were of four rows each, three and one-half feet apart, and ninety-two yards long, located one and one-half miles northwest of Bessmay, on fairly well drained, level upland, moderately fertile, slightly spotted, sandy soil with clay subsoil. The land has been under cultivation about seventy years; has given good results from complete commercial fertilizer, and produces forty bushels of corn or one-half bale of cotton per acre. The fertilizer was applied about one week before the cotton was planted May 12. All plots suffered from too much rain, but plots 1, 2, 3, and 4 did not have so good a chance as the others on account of poor stand.

Description of soils Nos. 9376-9377. Depth 0″-7″. Located one and one-half miles west of Bessmay, Jasper county. The fertility is moderate and the situation is upland. In wet seasons the soil runs together and the crop yield is very good. In dry seasons the soil is loose and gives a moderate yield. It packs, runs together, and crumbles on drying. It has been under cultivation for about seventy years. No green crops have been plowed under. Plants produce fairly good stalks. Cotton dies in spots. One acre produces one-third bale cotton or seventeen bushels corn. The sample represents about twenty acres of farm.

No. 9377. Depth 7″-15″. This is a subsoil to 9376.

A. W. West, Kirbyville, Jasper County. Experiment 435. Plots were of three rows each, four and one-third feet apart, and 118 yards long, located three miles north of Kirbyville on well drained, uniform, poor, upland, sandy loam soil with light red subsoil. The land has been under cultivation ten years, and has shown little increase in yields

from application of complete commercial fertilizers, and averages about 400 pounds of seed cotton per acre. All plots were damaged fifty per cent. by boll weevils.

Description of soil No. 9165. Depth 0″-7″. Located three miles north of Kirbyville, Jasper County, Section 60. This is a gray upland sand of moderate fertility. It does not overflow. The soil does not behave well in very wet or dry seasons. It runs together but does not pack or crumble on drying. The sample represents twenty acres of the farm and several thousands of the county. It has been in cultivation eleven years. Plants produce good stalks, but cotton dies. One acre produces twelve barrels of corn or 600 pounds seed cotton.

No. 9166. Depth 7″-18″. This is a subsoil to 9165. It has a yellow color.

R. L. Newson, Route 1, Cleburne, Johnson County. Experiment 436. This experiment was run on plots of three rows each, three feet apart, and 160 yards long, located three miles east of Rio Vista on well drained, uniform, poor, upland, light sandy soil with red clay subsoil. The land has been under cultivation about forty years. Applications of cottonseed meal and acid phosphate have given good results, and it usually produces about one-third bale of cotton per acre. All plots suffered alike from leaf worm, wet spring and dry summer.

H. A. McDaniel, Route 2, Marquez, Leon County. Experiment 437. This experiment was run on plots of five rows each, three and one-third feet apart and 224 feet long. The land is fairly well drained, uniform, poor, upland, light sandy soil with yellow and red sandy subsoil. The land has been under cultivation for twenty years, and has formerly shown only slight increase of yield from use of fertilizers. It produces 300 pounds of cotton per acre during favorable weather. The cotton was planted April 20 and was all damaged by wet weather. Plots 1, 2, and 3 did not have quite so good a stand as the others.

J. B. Webb, Route 1, Lubbock, Lubbock County. Experiment 438. This experiment was run on plots of three rows each, three feet apart, and 480 feet long, located six miles northeast of Lubbock on well drained, good, uniform, upland, dark red soil with red clay subsoil. The land has been under cultivation for five years, but has never had an application of fertilizer before. Cotton all received the same treatment and showed marked improvement from the use of the fertilizer in experiment.

Description of soil No. 9297. Depth 0″-8″. Located eight miles east of Lubbock, Lubbock County. The fertility is good and uniform. It is locally called "sandy loam." It has an upland and rolling situation. There are no wet seasons. It stands drouth remarkably well. It does not pack or run together, but crumbles on drying. It has been in cultivation for six years. No fertilizer or manure has been applied, nor have any green crops been turned under. Plants produce a good stalk. Cotton does not die. Sample is representative of 160 acres of farm. One acre produces one-half bale cotton.

Thomas Walker, Naples, Morris County. Experiment 439. This experiment was carried out on plots of two rows each, four feet apart, and sixty-five yards long. The land is well drained, moderately fertile, uniform, upland, red sandy soil with some gravel in parts and a red clay subsoil. It has been under cultivation for twenty years. It has had complete fertilizer applied, and produces one-half bale of cotton per acre. All plots had one load of manure applied besides the fertilizer prescribed. All plots responded readily from the fertilizer except No. 2, but plots 9 and 10 did better than others. All were damaged by worms.

Joseph Watson, Brighton, Nueces County. Experiment 440. This experiment was performed on plots of four rows each, three feet apart, and 120 yards long, located fourteen miles south of Corpus Christi, on well drained moderately fertile, uniform, upland, sandy soil with a reddish clay subsoil. The land has been under cultivation six years and has responded fairly well when complete fertilizers were applied. It yields from one-half to three-fourths bale of cotton per acre. Nitrate of soda has always given negative results when applied to general crops on this land. The season was good, except it was hard to secure a good stand. Plots 9 and 10 were planted over and suffered more from weevils.

Description of soils Nos. 9279-9280. Depth 0″-12″. Located fourteen miles south of Corpus Christi, Nueces County, Section 40, Flour Bluff survey. The fertility is moderate and uniform. It is called "Nueces fine white sand." Excessive rains retard growth, but it stands drouth well. It does not pack, run together, or clod, but crumbles on drying. One acre has been cultivated seven years with a fair to good yield. No fertilizer or manure has been applied; nor have any green crops been plowed under. Plants produce fair stalks. Cotton does not die. The sample represents thirty acres of the farm and 10,000 acres of the county.

No. 9280. Depth 12″-24″. This is a subsoil to 9279.

G. A. Bradley, Route 1, Weatherford, Parker County. Experiment 441. This experiment was carried out on plots of two rows each, four feet apart, located eight and one-half miles east of Weatherford on well drained, moderately fertile, uniform, upland, dark sandy soil with red clay subsoil. The land has been under cultivation twelve years. It has never had an application of fertilizer, and yields about one-third bale of cotton per acre. All plots were damaged by weevils, and plot 1 suffered most from heavy rains, as it was formerly an old "back furrow."

R. R. Hall, Emory, Rains County. Experiment 442. This experiment was carried out on plots of four rows each, three and one-half feet apart, and 210 feet long. It is located two and one-half miles from Emory on well drained, moderately fertile, spotted, upland, light sandy soil with whitish clay subsoil. The land has been under cultivation for fourteen years, and produces about twenty bushels of corn per acre, but responds very poorly to the use of fertilizers. Plots 6, 7, 8, 9, and 10 produced

two cuttings of sorghum the year before, while the other had a large crop of grass plowed under, hence the great difference in yields.

J. R. Nally, Franklin, Robertson County. Experiment 443. This experiment was performed on plots of one row each, four feet apart, and 280 yards long, located one and one-half miles south of Franklin on well drained, upland, moderately fertile, uniform, light sandy soil with clay subsoil. The land has been under cultivation for five years and produces one-half bale of cotton per acre. It has never had an application of fertilizer. All plots were damaged alike by unfavorable weather conditions in the spring.

Description of soil No. 9040. Depth 0"-10". Located one and one-half miles south of Franklin, Robertson County. It is a dark sandy soil, locally known as "sandy loam." The situation is upland.

No. 9041. Depth 10"-18". This is a subsoil to 9040. It is a red sand.

L. B. James, Ballinger, Runnels County. Experiment 444. This experiment was performed on plots of four rows each, four feet apart, and 140 feet long. It is located six miles west of Ballinger on well drained, bottom land with no overflows. It is moderately fertile, uniform, red valley silt soil with subsoil of the same material. The land has been under cultivation from thirteen to fifteen years. It gave poor results when potash was applied years ago, but produces forty bushels of corn or one bale of cotton per acre. All plots were damaged alike by heavy rains in August. The adjoining land was also fertilized. Two hundred pounds of acid phosphate were applied on one acre and produced 3000 pounds of cotton. Two hundred pounds of acid phosphate were applied on the second acre, together with seven loads of lot manure, and it produced 3200 pounds of cotton.

O. J. Berry, Route 1, Henderson, Rusk County. Experiment 445. This experiment was performed on plots of four rows each, four feet apart, and 280 feet long, located three miles west of Henderson on well drained, upland, uniform, moderately fertile, Norfolk fine sand with yellow sandy subsoil. Land has been cultivated about twelve years and has given poor results from fertilizers. It produces about ten bushels of corn per acre. Plots 7, 8, 9, and 10 were damaged by a washout.

Description of soil No. 9285. Depth 0"-12". Located three miles southwest of Henderson, Rusk County, Section 2, Henderson survey. This is a light gray sand of moderate and uniform fertility, called "Norfolk fine sand." It has an upland and rolling situation and is well drained. In wet seasons the soil washes to some extent, though not badly; in dry seasons it is blown by the wind. It does not pack, nor run together, crumble or clod on drying. It has been cultivated about fourteen years. Fertilizer was applied two years. The first year 150 pounds per acre showed no effect, none was applied the second year, and the third year 200 pounds per acre gave moderately good results. No manure has been applied. A green crop when plowed under in

1913 had good effect on the yield. Plants have moderately good stalks. Cotton does not die. The sample represents the whole farm and nearly thirty-five per cent. of the county. One acre produces 500 to 800 pounds seed cotton or ten bushels corn.

No. 9286. Depth 12"-24". This is a subsoil to 9285. It is a yellow sand.

M. Law, Route 1, Henderson, Rusk County. Experiment 446. Experiment was performed on plots of four rows each, four feet apart, and 280 feet long, located three miles west of Henderson, on well drained, upland, moderately fertile, uniform, dark sandy land with clay subsoil. The land has been under cultivation three years, but no fertilizer has been applied. Plot 2 suffered most from drouth in June and July. All plots were damaged by leaf worms.

E. J. McGown, Route 1, Milam, Sabine County. Experiment 447. The plots were of two rows each, four feet apart, and 575 feet long. All plots were damaged by drouth; besides, all the plots had to be planted over.

J. L. McAdams, Oakhurst, San Jacinto County. Experiment 448. The experiment was performed on plots of three rows each, three and one-half feet apart, and 110 yards long, located three miles southeast of Oakhurst, on fairly well drained upland, moderately fertile, uniform, loamy soil with clay subsoil. The land has been under cultivation four years and had a little fertilizer applied once, which gave good results. It usually produces from one-half to three-fourths bale of cotton per acre. Plot 1 was destroyed by spring rains; plots 6 and 7 suffered most from drouth in July; plots 3 and 9 made large stalks, but did not fruit in proportion, while plot 4 opened earlier than the others.

J. S. Hale, Route 1, Troup, Smith County. Experiment 449. Experiment was run on plots of five rows each, three feet apart, and 290 feet long, located one and one-half miles north of Troup on well drained, upland, moderately fertile, uniform dark loamy soil with red clay subsoil. On this land cottonseed meal and acid phosphate have always given good results. The land has been under cultivation about fourteen years, and produces about one-half bale of cotton per acre. All plots were cultivated alike and all suffered from leaf worms.

J. W. Malone, Route 1, Troup, Smith County. Experiment 450. The experiment was run on plots of four rows each, four feet apart, and 280 feet long, located one and one-half miles north of Troup on well drained, upland, moderately fertile, uniform, light sandy soil with dark red subsoil. Fertilizer has been used before on this land. The land has been under cultivation eight years and produces 750 pounds of seed cotton per acre. Plot 10 was on the highest part of the land and there was a gradual slope to plot 1. The spring was very wet. This may partially account for the larger yields on plots on the high land.

Description of soil No. 9283. Depth 0"-12". Located one mile north of Troup, Smith County, abstract 186, N. Miller survey. The fertility

is good and uniform. The situation is upland. It behaves well in wet seasons, and stands drouth only fairly well. It does not pack, run together, or clod on drying, but it crumbles on drying. It has been in cultivation for fifteen years. Two hundred pounds commercial fertilizer were applied for three years previous to 1914 with good results. No manure has been applied, nor have any green crops been plowed under. The plants produce fairly good stalks, and cotton does not die. One acre produces one-half bale cotton or from thirty to thirty-five bushels corn. The sample represents fifty acres of the farm and one-half of the county.

No. 9284. Depth 12"-24". This is a subsoil to 9283.

A. R. Ivey, Route 1, Winfield, Titus County. Experiment 451. The experiment was performed on plots of six rows each, three and one-half feet apart, and fifty yards long, located eight miles northwest of Winfield, on fairly well drained upland, moderately fertile, uniform, gray sandy loam surface soil with yellowish red subsoil. The land has been under cultivation for about fifteen years and produces from one-fourth to one-half bale of cotton per acre. All plots were greatly damaged by leaf worms.

Ben Burke, Jr., Centralia, Trinity County. Experiment 452. The experiment was performed in plots of four rows each, four feet apart, and eighty-three yards long, located three and one-half miles northeast of Centralia, on well drained, fertile, uniform, first bottom, light sandy soil with black sticky subsoil. The land has been under cultivation for sixteen years and has never had an application of fertilizer before. It produces forty-two bushels of corn or one bale of cotton per acre. The lot manure was not applied to plot 9 as directed. All plots received the same cultivation.

A. N. W. Smith, Big Sandy, Upshur County. Experiment 453. This experiment was performed on plots of two rows each, three and one-half feet apart, and 210 feet long, located two and one-half miles west of Big Sandy, on well drained, hilly, upland, fertile, uniform, gray sandy soil with clay subsoil. The land has been under cultivation one year and has given good results from fertilizers. The yields from plots 8, 9, and 10 were not reported, due to error of pickers. The other plots yielded approximately the same amount of cotton, though this may have been due to the fact that they were subjected to heavy washing rains in the spring, and long drouth in summer.

J. M. Anders, Route 4, Wills Point, Van Zandt County. Experiment 454. This experiment was carried out on plots of seven rows each, three and one-half feet apart and eighty-two yards long, located nine miles southeast of Wills Point, on fairly well drained, upland, poor, uniform, light sandy soil with red clay subsoil. The land has been cultivated twenty years and produces 200 pounds of lint cotton per acre. Heavy rains in spring caused a very poor stand, while drouth hurt all plots in summer. The fertilizers made a marked increase of yield over unfertilized plots.

Description of soil No. 9171. Depth 0″-12″. Located eight miles southeast of Wills Point, Van Zandt County. This is a yellow sand with an upland and rolling situation. The fertility is poor. It behaves well in dry seasons. Six tons of manure were applied in 1913 and ten tons in 1914, with good results. The plants produced large stalks in 1914. Cotton does not die. Sample represents twenty-eight acres of the farm. Thirty-five acres produced twenty-eight bales cotton and fifty bushels corn.

No. 9172. Depth 12″-24″ or 30″. This is a subsoil to 9171. It is a yellow sand.

W. J. Gardner, Route 4, Wills Point, Van Zandt County. Experiment 455. This experiment was run on plots of four rows each, three and one-fourth feet apart, and 335 feet long, located one and one-half miles north of Myrtle Springs, on well drained, uniform, moderately fertile, upland, sandy loam soil with clay subsoil. The land has been cultivated ten or twelve years, and produces about one-half bale of cotton or 100 bushels of sweet potatoes per acre without the use of fertilizer. All plots were damaged by army worms and drouth, but the fertilized plots showed a remarkable increase over the unfertilized plots.

Description of soil No. 9309. Depth 0″-6″. Located eight miles southeast of Wills Point, Van Zandt County. This is a soil of good and nearly uniform fertility, locally called "dark sand." It has an upland situation. Soil behaves very well in wet seasons, and moderately well in dry seasons. It does not pack or run together badly. It crumbles on drying and clods if plowed. It has been in cultivation twelve years. Plants produce good stalks. Sample represents one-half of farm and one-third of county. One acre produces 100 bushels sweet potatoes or one-third to one-half bale cotton.

No. 9310. Depth 6″-18″. This is a subsoil to 9309.

Willie McDermitt, Chapel Hill, Washington County. Experiment 456. The experiment was performed on plots of two rows each, three and one-fourth feet apart, and 246 feet long, located at Chapel Hill, on well drained, poor, uniform, upland, white sandy soil with gray subsoil. The land has been under cultivation for twenty-five years, and produces about one-fourth bale of cotton or fifteen bushels of corn per acre without fertilizer. All plots were cultivated alike, but plots 9 and 10 were at a disadvantage by natural location.

W. H. Wedemeyer, Route 2, Burton, Washington County. Experiment 457. This experiment was performed on plots of six rows each, three and one-half feet apart, and sixty yards long, located seven miles south of Burton on well drained, poor, uniform, level upland, light sandy soil with a stiff yellow clay subsoil. This land has been under cultivation about twenty-five years, and produces about one-fourth bale of cotton per acre. Complete fertilizers increase the yield very little. All plots were cultivated alike.

W. J. McCullum, Route 6, Sherman, Grayson County. Experiment 458. Plot is located two and one-half miles north of Howe on very good, well drained black and gray spotted, upland, loamy soil with yellow clay subsoil. It has been under cultivation thirty years; never before had fertilizer been applied to it. It produces one-half bale of cotton per acre. Plots are of four to six rows each, three and one-half feet apart and sixty yards long. Plot 3 burned up badly on account of unfavorable weather conditions.

DESCRIPTION OF EXPERIMENTS—COTTON, 1915

Frank Buskemper, Austin County. Experiment 459. Plot is located four miles from New Ulm, on upland, moderate soil. The land has been cultivated for thirty years, and produces one-third bale of cotton per acre. The surface soil is dark sand. Cotton planted on April 14 in two rows, three and one-half feet apart and 330 feet long. All plots were cultivated alike and harvested in September and October. All plots were damaged by storms and later by drouth.

Description of soil No. 11,420. Depth 0″-6″. Located at New Ulm, Austin County. This is upland soil of moderate fertility. The land has been cultivated forty years. The soil is a gray sandy loam; runs together and packs. Plants produce good stalks.

No. 11,421. Subsoil to 11,420. Depth 6″-12″. This soil is also a gray sandy loam.

Table 33.—Seed cotton per acre, 1915.

Laboratory No.		Nothing—1	Nothing—8	150 lbs. acid phosphate.	200 lbs. cottonseed meal.	150 lbs. acid phosphate, 100 lbs. cottonseed meal, 50 lbs. nitrate of soda.	150 lbs. acid phosphate, 200 lbs. cottonseed meal.	150 lbs. acid phosphate, 200 lbs. cottonseed meal, 20 lbs. sulphate of potash.	150 lbs. acid phosphate, 200 lbs. cottonseed meal, 50 lbs. sulphate of potash.	10 loads manure.	150 lbs. acid phosphate, 10 loads manure.
459	Frank Burkemper, Austin Co.....	130	140	170	200	270	240	290	260	160	190
460	Frank J. Kosler, Colorado Co.....	490	450	530	530	480	470	510	510	500	460
461	J. W. Bell, Henderson Co.....	1320	930	1410	1360	1390	1360	1200	1210	1040	980
462	J. S. Kimbler, Hunt Co.....	480	510	580	550	560	610	600	580	630	660
463	C. M. Thompson, Mitchell Co.....	1290	1380	1590	1440	1180	1690	1580	1550	1360	1420
464	Eura Davidson, Panola Co.....	500	520	650	570	810	660	720	800	950	970
465	H. D. Jordan, Parker Co.....	380	350	500	460	700	680	560	590	500	570
466	T. S. McDaniel, Sabine Co.....	490	460	680	540	860	800	880	900	940	970
467	H. T. Lovett, San Jacinto Co.....	400	440	820	800	880	840	880	920	1200	920
468	John Kelly, Smith Co.....	350	350	370	500	450	750	700	700	450	6 0
469	L. K. Davis, Tarrant Co.....	.....	400	680	710	740	730	800	750	.....	710
	Average.....	583	539	725	696	747	802	793	797	773	685

Frank J. Kosler, Colorado County. Experiment 460. Plot is located six miles southwest of Weimar, on well drained, hilly upland. The soil is moderate and uniform with a sandy and dark clay subsoil. The land has been cultivated twenty-five to thirty years and has produced one-fourth bale of cotton and twenty-five bushels of corn an acre. Fifty to seventy-five loads of barnyard manure a year have been used on the

land. Some commercial fertilizer has been used with fair results. Land was broken on February 9. Cotton was planted on April 8 in three rows forty inches apart and 145 yards long. Fertilizer was applied by hand. All plots were cultivated alike. A severe storm on April 16 damaged the entire field and reduced yield by one-half. Crop was picked in August and September.

Description of soil No. 11,245. Depth 0"-10". Located six miles southwest of Weimar, Colorado County. This is rolling upland soil of moderate fertility. It produces thirty bushels of corn or one-third bale of cotton per acre. Soil has been in cultivation twenty years. The soil is dark, chocolate brown, sandy loam. Does not pack or run together. Soil behaves well during wet and dry seasons. Sample taken from a forty-acre field.

No. 11,246. Subsoil to 11,245. Depth 10"-20". This soil is also a chocolate brown loam.

J. W. Bell, Henderson County. Experiment 461. Plot is located five miles northeast of Athens, on well drained upland. Soil is good and uniform with a red loam surface soil. The land has been cultivated five years, and has produced three-fourths bale of cotton an acre, and thirty bushels of corn. Fertilizers have been used with good results. Land was broken in February and cotton was planted on May 20 in five rows, five feet apart and seventy yards long. Fertilizer was applied by hand. The land was flat broken, planted flat, and cultivated at all times with a spring tooth harrow. The cotton was picked on October 10. Plots 6, 7, 8, 9, and 10 were damaged by wet weather and boll weevils. Cottonseed meal and barnyard manure made stalks grow too large.

Description of soil No. 11,253. Depth 0"-10". Located five miles from Athens, Henderson County. This is upland, sloping to the west, and of moderate fertility. It produces twenty bushels of corn, or 1000 pounds seed cotton per acre. The soil is a gray, fine, sandy loam. Soil does not pack badly, but runs together to some extent and clods on drying. Plants produce extra large stalks and cotton does not die. The sample represents very small part of county.

No. 11,254. Subsoil to 11,253. Depth 10"-20". This soil is a yellow, fine sand.

J. S. Kimbler, Hunt County. Experiment 462. Plot is located three miles south of Campbell, on well drained upland. Soil is good and uniform, and has only one crop raised on it. The surface soil is a dark loam and the subsoil is a joint clay. Land was broken and bedded by March 5 and cotton was planted on April 15 in four rows, four feet apart, and 280 feet long. Fertilizer was applied by hand. Cotton was all damaged by storm. It was harvested in October.

Description of soil No. 11,418. Depth 0"-9". Located three miles south of Campbell, Hunt County. This is upland soil and fertile. Drainage is good. It produces one-fourth bale of cotton per acre. The land has been in cultivation two years. The soil is gray, sandy

loam, which packs, runs together and clods. Cotton does not die. In wet seasons made good stalks but little fruit.

No. 11,419. Subsoil to 11,418. Depth 9″-21″. This soil is dark gray clay loam.

Charlie Thompson, Mitchell County. Experiment 463. Plot on Loraine town section on well drained, level upland. Soil moderate and uniform, with a dark sandy red clay surface soil and a clay subsoil. The land has been cultivated six years and has produced one-third bale of cotton per acre. No fertilizer has been used on this land. Land was broken in January and cotton was planted on April 21 in six rows, three and one-half feet apart, and seventy yards long. Fertilizer was applied by cotton planter. All plots were worked alike and at the same time. All plots were damaged by hail. Cotton was picked in October.

Description of soil No. 11,264. Depth 0″-9″. Located one-half mile south of Loraine, Mitchell County. This is rolling and of moderate fertility. This soil is a reddish brown, clay loam. Plants produce good stalks and cotton does not die. One acre fertilized gave good results. Fair yield every year, extra good yield in wet seasons, medium yield in dry season.

No. 11,265. Subsoil to 11,264. Depth 9″-12″. This soil is also a reddish brown clay loam.

Eura Davidson, Panola County. Experiment 464. Plot is situated east of Beckville on well drained upland. Soil is moderate and uniform in character and has produced 400 pounds of cotton an acre. The land has been in cultivation for twenty-five years and has always been productive. The surface soil is white and the subsoil is red clay. Commercial fertilizer has been used with good results. The land was broken in March and cotton was planted on May 1, in two rows per plot, three feet apart, and 250 yards long. Fertilizer was applied by hand, and all plots were worked alike. All plots were damaged by boll weevil. The cotton was picked in October.

H. D. Jordan, Parker County. Experiment 465. Plot located on well drained hillside. Soil is moderate and spotted in character, with a black loam surface soil, and a red and blue subsoil. The land has been in cultivation for twenty-five years. Barnyard manure has been used on this farm. Cotton was planted during May in four rows per plot, three and one-half feet apart, and 143 feet long. Fertilizer was applied with a planter. All plots were damaged by boll weevils and root rot.

T. S. McDaniel, Sabine County. Experiment 466. Plot situated one and one-half miles south of Fairdale, on well drained first bottom. Soil is moderate and uniform, with a black surface soil, and a joint clay subsoil. Land had been in cultivation three years, and has produced 700 pounds of cotton on an acre. Land was broken in February and cotton was planted May 1 in three rows per plot, four feet apart

and 105 yards long. Fertilizer was applied by hand. All plots were damaged in yield by drouth. Cotton was picked in October.

H. L. Lovett, San Jacinto County. Experiment 467. Plot is located west of Shepard, on well drained second bottom. Soil is poor and uniform, with surface soil of light sand and subsoil of clay. The land has been in cultivation twenty years and has produced fifteen bushels of corn per acre. Barnyard manure and commercial fertilizers of cottonseed meal, acid phosphate, and potash have been used on this soil. Land was broken in February and cotton was planted on April 30 in four rows per plot, four feet apart and seventy yards long. Fertilizer was applied by distributer in furrow. All plots were damaged by a storm in August. Cotton was picked in September.

Description of soil No. 11,310. Depth 0″-6″. Located near Shepard, San Jacinto County. This is rolling, moderately poor soil. Soil packs and runs together, and crumbles on drying. No overflow. Plants produce good stalks. Cotton dies. Soil is grayish yellow sand.

No. 11,311. Subsoil to 11,310. Depth 6″-12″. This soil is yellow sand.

John Kelly, Smith County. Experiment 468. Plot is situated on well drained upland. Soil is poor and not mixed. The land has been in cultivation for thirty-five years, and has produced 450 pounds of cotton per acre. The surface soil is white sand with a subsoil of clay. The land was broken in January, and planted to cotton on May 7, with two rows per plot, four feet apart and 280 feet long. The drouth damaged all the plots.

Description of soil No. 11,262. Depth 0″-10″. Located five miles south of Tyler, Smith County. This is poor upland, rolling slightly. It produces 300 pounds cotton per acre. Land has been in cultivation thirty-five years. The soil is yellowish white fine sandy loam. Does not pack, run together, or clod. Plants produce poor stalks, but cotton does not die. The yield is greater in wet seasons than in dry seasons.

No. 11,263. Subsoil to 11,262. Depth 10″-16″. This soil is also a yellowish white.

L. K. Davis, Tarrant County. Experiment 469. Plot is about three and one-half miles north of Grapevine, on well drained, gently rolling, second bottom. Soil is moderate and spotted with a light gray sandy subsoil, which has a few clay spots through it. The subsoil is four to eight inches deep, of red clay. The land has been in cultivation thirty-five years and has produced 600 pounds of cotton per acre. Cotton was planted on May 29 in two rows per plot, three and one-half feet apart and 250 yards long. The fertilizer was applied with a cotton planter. All plots were damaged by boll weevils. Picked on October 20.

DETAILS OF COTTON EXPERIMENTS, 1916

P. Neshyba, New Ulm, Austin County. Experiment 470. Two miles southwest of New Ulm. Land is moderate and spotted in character,

produces two-fifths of a bale of cotton an acre, in cultivation ten years. It was post oak land. Upland, surface soil dark and sandy, with a sand clay subsoil. Land broken in March. Cotton planted on April 17 and harvested during September. Fertilizer applied by hand into an open furrow, then mixed with soil by an eighteen-inch sweep. Two rows per plot, three and one-half feet apart and 600 feet long. All plots cultivated alike. Plot 2 suffered from drouth.

Table 34.—Seed cotton per acre.

Laboratory No.		Nothing.	150 lbs. acid phosphate.	200 lbs. cottonseed meal.	150 lbs. acid phosphate, 100 lbs. cottonseed meal, 50 lbs. nitrate of soda.	150 lbs. acid phosphate, 200 lbs. cottonseed meal.	150 lbs. acid phosphate, 200 lbs. cottonseed meal, 20 lbs. sulphate of potash.	150 lbs. acid phosphate, 200 lbs. cottonseed meal.	Nothing.	One load manure.	10 loads manure, 150 lbs. acid phosphate.
470	P. Neshyba, Austin Co.	880	970	880	920	910	1050	1050	870	1030	1160
471	Z. D. Page, Clay Co.	300	340	420	510	520	510	460	500	500	490
472	Y. B. Reed, Fannin Co.	340	430	460	340	480	420	410	390	380	410
473	Howth Allen, Fannin Co.	750	780	770	790	810	770	770	820	880	880
474	L. T. Manning	570	760	660	840	790	890	860	800	860	870
475	R. Arnold, Trinity Co.	750	800	820	900	950	850	750	1100	1250	.....
476	W. H. Wedemeyer, Washington Co.	830	910	1140	1220	1230	1260	1170	1050	1130	930
	Average.	631	713	736	789	813	821	781	761	861	790

Z. D. Page, Newport, Clay County. Experiment 471. Fifteen miles northeast of Jacksboro. Soil good and uniform in character, produces 800 pounds of cotton and twenty bushels of corn, in cultivation twenty years. Was dark sandy post oak land. Lowland, surface soil black and sandy, with black clay subsoil, well drained. Land broken in January. Cotton planted on May 28, picked during first and second week in October. Fertilizer applied by hand. Eight rows per plot, four feet apart and seventy feet long. Land broken, listed and planted with one-row planter. Fertilizer mixed with a small plow. All plots damaged by weevils and drouth.

Y. B. Reed, Trenton, Fannin County. Experiment 472. Three miles northwest of Randolph. Soil moderate and uniform in character, produces one-third bale of cotton, in cultivation forty years. Upland, surface soil sandy, and dark red subsoil, yellow clay and dark gumbo. Drainage good. Land broken in August. Cotton planted April 11, and picked September 14 to October 8. Fertilizer applied with planter. One row to the plot, rows three feet apart and 300 yards long. Broken with sulky, bedded with buster, subsoiled in March. All plots cultivated alike, and all damaged by drouth.

Description of soil No. 12,982. Depth 0″-8″. Located two and one-half miles northwest of Randolph, Fannin County. This is uniform, poor, upland, level soil. It produces a low yield. The land has been cultivated twenty-five years. No fertilizer or manure applied. No crops plowed under. The soil is a drab clay, gets tight, holds water

in wet seasons. It gets tight and crusty in dry seasons. Plants do not produce good stalks and cotton dies.

No. 12,983. Subsoil to 12,982. Depth 0″-15″. This soil is a brown clay.

Howth Allen, Honey Grove, Fannin County. Experiment 473. Located two and one-fourth miles north of Honey Grove, on good and uniform soil, which produces thirty bushels of corn and one-half bale of cotton, in cultivation twenty years. It was timber land, second bottom. Surface soil deep, black and waxy, subsoil gravelly clay and far below surface, with good drainage. Land broken in January. Cotton planted on May 5 and picked between September 18 and October 30. Fertilizer applied by hand. Four rows per plot, three feet four inches apart and 105 yards long. Plowed five times with cultivator and hoed three times.

Description of soil No. 12,963. Depth 0″-8″. Located two and one-half miles north of Honey Grove, Fannin County. This is uniform, good and fertile upland and rolling, does not overflow. It produces one-fourth to one-half bale of cotton, twenty-five to forty bushels of corn per acre. Land has been in cultivation twenty years. No fertilizer or manure used, and no green crops turned under. This soil is a dark gray clay, does not pack or clod on drying, but runs together and crumbles. In wet seasons cotton is poor, and corn very good. In dry seasons cotton is good and corn very good. Plants produce a good stalk, and cotton dies in small spots.

No. 12,964. Subsoil to 12,963. Depth 8″-22″. This soil is also a dark clay.

Leslie T. Manning, Vineyard, Jack County. Experiment 474. Ten miles southeast of Jacksboro. Soil moderate and uniform in character. Produces thirty-five bushels of oats and thirty bushels of kafir corn, in cultivation twenty years. Mesquite prairie, cotton, corn, kafir and oats have been grown on the land. One light crop of blackeyed peas was turned under two years previously. A small amount of barnyard manure has been used with good results. Upland surface soil, dark sandy loam, with red clay subsoil. Terraced four feet to 100. Land broken in January. Cotton planted on April 21 and replanted on May 8, picked in September and October. Fertilizer applied April 20 by a two-horse cotton planter. Two rows per plot, three and one-half feet apart and 210 yards long. All plots cultivated alike, harrowed three times, cultivated five times, thinned July 10, topped July 25. All plots damaged by weevils. Plots 1 and 5 near terraces.

Description of soil No. 13,186. Depth 0″-9″. Ten miles east of Jacksboro, Jack County. This is of moderate fertility, thinner on high ground, slightly rolling, upland. It produces a little above the average for the county. Soil in cultivation twenty years. Cattle were allowed to graze on this land. No manure was applied. Volunteer oats where turned under gave a ten per cent. increase in yield. All trash turned under each winter. The soil is a brown clay loam. Most

productive in wet seasons. Soil holds moisture well. Crops endure drouth well. Soil does not pack or run together badly. Does not crumble on drying and only clods on drying when stirred wet. Plants produce medium stalks and cotton does not die.

No. 13,187. Subsoil to 13,186. Depth 9″-21″. This soil is a brown clay loam.

Richard Arnold, Nathan, Trinity County. Experiment 475. Eight miles from Helmic. Soil moderate and mixed in character. Produces fifteen bushels of corn and 800 pounds of cotton, in cultivation twenty-five years. Upland, surface soil is a light sand, with a yellow clay subsoil. Drainage very good. Land broken in January. Cotton planted April 15 and picked during September and October. Fertilizer applied by hand. Four rows per plot, three and one-half feet apart and 280 feet long. All cultivated alike. All plots damaged by boll weevils and by rain in the spring.

W. H. Wedemeyer, Burton, Washington County. Experiment 476. Seven miles south of Burton. Upland soil, moderate and uniform in character. Produces fifteen bushels of corn and 500 pounds of cotton. In cultivation fifty years. Planted in corn, cotton, or sorghum, and fertilized sometimes. Barnyard manure used with good results. Surface soil light sandy with clay foundation, subsoil yellowish to red clay, with good drainage. Land broken in November. Cotton planted on April 28 and picked on September 22. Fertilizer applied by distributer. Four rows per plot, three and one-half feet apart and eighty yards long. All plots bedded twice and cultivated three times. After planting and chopping the first time, plots 7, 8, 9, and 10 were damaged by wilt; plots 1, 2, 3, 7, 8, 9, and 10 were all damaged.

Description of soil No. 12,984. Depth 0″-8″. Located seven miles south of Burton, Washington County. This is nearly uniform, poor, upland, rolling. This land has been in cultivation fifty years. This field was planted in sorghum a good deal. Fertilized with five tons manure per acre frequently, with good results. No green crop has been turned under. Soil becomes soggy in wet seasons. Soil runs together and needs stirring before it forms a crust, and clods on drying. Soil is a brown sand.

No. 12,985. Subsoil to 12,984. Depth 8″-12″. This soil is brown and gray clay and sand.

DETAIL OF COTTON EXPERIMENTS, 1917

R. L. Newsom, Cleburne, Jackson County. Experiment 477. Farm three miles east of Rio Vista. Upland soil, moderate and uniform, produces one-fourth bale of cotton an acre, and has been in cultivation for thirty years. Surface soil is light and sandy, subsoil is a red clay. Drainage is good. Land broken in January. Acid phosphate and cottonseed have been used for fertilizer with good results. Cotton planted on May 28 and picked in October and November. Fertilizer

applied with planter. Three rows per plot, 150 yards long and three feet apart. All plots cultivated alike. All damaged by drouth.

Table 35.—Seed cotton, pounds per acre, 1917.

Laboratory No.		Nothing.	150 lbs. acid phosphate.	200 lbs. cottonseed meal.	150 lbs. acid phosphate. 100 lbs. cottonseed meal, 50 lbs. nitrate of soda.	150 lbs. acid phosphate, 200 lbs. cottonseed meal.	150 lbs. acid phosphate, 200 lbs. cottonseed meal, 20 lbs. sulphate of potash.	150 lbs. acid phosphate, 200 lbs. cottonseed meal.	Nothing.	One load manure.	150 lbs. acid phosphate, one load manure.
477	Ralph Newsom, Johnson Co.....	300	400	510	1100	1080	1120	1130	320	600	800
478	W. T. Hays, Montague Co.....	140	220	223	300	330	340	375	380	500	540
479	H. D. Jordan, Parker Co.....	410	460	570	450	450	470	390	400	420	440
	Average.....	283	360	434	617	620	643	632	367	507	593

W. T. Hayes, Montague, Montague County. Experiment 478. Farm four miles east of Montague. Soil moderate and uniform, upland, slightly rolling, producing one-eighth bale of cotton (when damaged by boll weevils), and has been in cultivation for twenty years. No fertilizer has been used; cropped continuously. Surface soil is a sandy loam, not deep, and light red in color. Subsoil is a stiff clay. Good natural drainage. Land broken in December. Cotton planted on May 17 and picked in November. Fertilizer applied by drill under seed. Four rows per plot, 105 yards long and three and one-half feet apart. All plots cultivated alike. Stand in plots 1, 2, 3, 5, 6, and 7 fifty per cent.; in plots 4, 8, 9, and 10 about seventy per cent.

H. D. Jordan, Weatherford, Parker County. Experiment 479. Soil poor and uniform, level upland, in cultivation twenty-five or thirty years. It is benefited by barnyard manure. Surface soil is dark, sandy; subsoil a red clay, with fair drainage conditions. Land broken in November, cotton planted on April 21 and picked in September and October. Three rows per plot, 390 feet long and three and one-half feet apart. Fertilizer applied with walking planter. All plots cultivated alike. All damaged by boll weevils.

DESCRIPTION OF EXPERIMENTS—CORN, 1915

Edgar Huston, Anderson County. Experiment 480. Plot is located two and one-half miles east of Poyner, on a well drained, upland soil. The soil is moderately fertile and uniform. The surface soil consists of a light sand and the subsoil of clay. The farm has been under cultivation for sixteen years and has produced one-third bale of cotton and seventeen bushels of corn an acre. Some fertilizer has been used before with good results. Corn was planted on March 10 in plots of six rows each, three and one-fourth feet apart and seventy yards long. The fertilizer was applied by hand. All plots were cultivated alike. The tenth plot grew and matured the quickest.

Table 36.—Corn, bushels per acre, 1915.

Laboratory No.		Nothing—1	Nothing—8	150 lbs. acid phosphate.	200 lbs. cottonseed meal.	150 lbs. acid phosphate, 100 lbs. cottonseed meal, 50 lbs. nitrate of soda.	150 lbs. acid phosphate, 200 lbs. cottonseed meal.	150 lbs. acid phosphate, 200 lbs. cottonseed meal, 20 lbs. sulphate of potash.	150 lbs. acid phosphate, 200 lbs. cottonseed meal, 50 lbs. sulphate of potash.	10 loads manure.	150 lbs. acid phosphate, 10 loads manure.
480	Edgar Huston, Anderson Co	25.7	24.0	28.7	29.3	37.1	36.1	36.0	34.9	29.7	43.0
481	W. O. Berry, Angelina Co	8.0	12.7	10.3	9.3	15.0	16.1	18.9	21.3	24.1	27.3
482	J. P. Carnes, Brazos Co	20.1	20.3	22.1	20.4	23.0	20.6	22.4	23.4	.....	.....
483	Albert Williams, Burnet Co	38.6	35 2	37.1	38.7	37.3	37.8	34.9	35.8	32.4	33.0
484	H. T. Redwine, Comanche Co	19.6	18.7	16.4	17.9	19.3	15.4	16.3	15.3	18.6	20.0
485	W. T. Lawrence, Coryell Co	23.1	18.0	15.4	25.7	18.0	20.6	16.7	16.7	14.1	14.1
486	H. A. Porter, Denton Co	13.7	13.7	13.4	17.6	18.4	16.9	17.7	18.6	20.6	22.9
487	V. B. Smith, Donley Co	41.4	37.6	35.7	36.6	34.4	35.4	36.3	35.7	35.4	26.4
488	Aubrey Gist, Erath Co	23.7	27.3	21.1	20.7	23.7	24.9	24.3	25.7	29 9	34.3
489	Robt. T. Wade, Erath Co	17.6	17.6	24.3	18.0	32.0	12.9	18.9	28.3	18.3	14.6
490	Wm. C. Frochner, Gonzales Co	14.0	17.4	15.3	13.4	10.7	16.0	17.4	17.6	15.4	11.4
492	W. A. Ray, Gregg Co	9.7	15.3	16.6	18.1	18 3	17.1	21.7	22.4	16.7	16 9
494	T. A. Callaway, Jack Co	24.6	22.4	22.1	23.6	26.0	26.0	27.3	27.1	27.6	27.9
495	A. G. Smith, Jack Co	6.6	5.4	7.9	6.1	7.3	4.9	4.3	4.4	7.1	.....
496	Will F. Pickett, Lampasas Co	29.6	27.3	34.4	34.7	35.0	35.1	34.4	33.0	22.9	35.9
497	J. H. Christopher, Matagorda Co	16.0	13.7	17.4	15.7	30.0	16.0	14.3	31.3	26.9	26.3
498	F. A. Scott, Mills Co	26.6	24.9	26.6	25.6	26.6	27.4	28.0	26.6	16.1	25.7
499	John A. Miller, Palo Pinto Co	9.0	12.9	12.6	20.0	16.0	12.1	10.0	11.3	15.4	20.0
500	E. O. Radford, Palo Pinto Co	24.3	24.7	26.3	26.6	27.7	27.1	26.9	28.4	26.0	26.6
501	J. T. Tisdale, Red River Co	28.6	40.1	37.4	38.4	44.9	54.9	59.4	61.3	70.9	75.0
502	J. L. Cochran, Rusk Co	20.0	16.0	23.1	27.4	32.0	29.7	28.3	30.3	26.6	30.0
503	J. M. Ashley, Rusk Co	8.7	9.0	9.7	10.1	12.4	11.9	11.3	12.1	11.4	12.1
504	T. G. Speights, Sabine Co	28.6	30.4	32.1	40.0	40 4	41.4	42 0	37.6	41.0	42.9
505	A. D. Winters, Smith Co	24.3	22.9	22.9	25.0	26.0	25.7	25.9	27.6	24.3	27.6
506	H. D. Farquhar, Waller Co	16.4	17.4	20.6	21.1	23.0	21.1	24.0	25.6	21.4	22.9
507	R. E. Leonard, Wise Co	10.0	17.9	12.9	11.4	17.1	18.6	21.4	15.7	15.7	19.3
508	L. C. Swenson, Wise Co	13.9	21.0	20.0	23.6	24.3	25.0	23.7	22.4	15.1	14.3
509	S. A. King, Wood Co	20.6	20.9	26.6	29.3	35.4	33.0	33.4	35.0	38.3	33.6
	Average	20.1	20.9	21.8	23.0	25.4	24.2	24.9	25.9	24.5	27.1

W. O. Berry, Angelina County. Experiment 481. Plot is located eight miles east of Huntington, on poorly drained upland. The soil is of good fertility and mixed in character, with a black clay surface soil and a clay subsoil. The soil has been in cultivation thirty years without any fertilizer having been applied. Corn was planted on March 30 in plots of three rows, three and one-half feet apart and 420 feet long. The land was broken in the fall, bedded and disked in the spring. The first, second, and third plots were damaged by insects. All plots except 9 and 10 were damaged by storm.

Description of soil No. 12,974. Depth 0"-6". Located ten miles from Lufkin, Angelina County. This is not uniform, moderate upland. It produces ten to twenty-five bushels of corn per acre. Land in cultivation fifteen years. No crop plowed under. Soil is hard to handle but produces good crops in wet years. Easy to handle in dry seasons with poor crops. The soil is a gray, or mottled with brown and white calcareous clay. Soil packs and crumbles on drying and does not run together or clod. Produces good stalks.

No. 12,975. Subsoil to 12,974. This soil is a gray mottled with brown and white calcareous clay.

J. P. Carnes, Brazos County. Experiment 482. Plot located ten miles east of Bryan, on well drained upland. The soil is of good fer-

tility and uniform, with a dark sandy surface soil and a yellow clay subsoil. The farm has been in cultivation fourteen years, and has produced twenty-five bushels of corn per acre. The land was broken in February and corn was planted in March, in plots of two rows each, four feet apart. All plots were damaged by insects. The corn was harvested on September 7.

Albert Williams, Burnet County. Experiment 483. Plot is situated four miles east of Oakalla, on well drained upland. The soil is good in fertility and uniform in character with a dark loam surface soil and a clay subsoil. The land has been in cultivation forty-five or fifty years, and the average yield has been twenty bushels of corn and one-third bale of cotton. Corn was planted on April 5 in plots of four rows each, four feet apart and 280 feet long. All plots were cultivated alike. The first plot was nearest irrigation ditch. All of the corn was irrigated. The crop was harvested on October 26.

Description of soil No. 11,375. Depth 0″-6″. Located eleven miles south of Copperas Cove, Burnet County. This is upland, level, of moderate fertility. It produces one-half bale of cotton or twenty-five bushels of corn per acre. The land has been in cultivation forty years. The soil is a drab clay loam, which packs, runs together and clods on drying. Plants produce good stalks but cotton dies in wet seasons. Soil cracks badly in dry weather.

No. 11,376. Subsoil to 11,375. Depth 6″-15″. This soil is a gray clay loam.

H. T. Redwine, Comanche County. Experiment 484. Plot is located three miles west of Sidney, on well drained, low mesquite land. Soil good black valley land and uniform. The farm has been cultivated eighteen years and the average acre yield is thirty bushels of corn, forty bushels of oats or one-half bale of cotton. Corn was planted on April 5, in three rows per plot, three and one-half feet apart and 420 feet long. Fertilizer was applied by hand. The whole crop was damaged by two months' drouth.

Description of soil No. 11,392. Depth 0″-5″. Located three miles west of Sidney, Comanche County. This is bottom land, fertile, mesquite land. It produces one-fourth bale of cotton per acre. This is good land but affected by boll weevils. No fertilizer has been used. Good crops in wet seasons, fair in dry seasons. This soil is a dark gray sandy loam, which packs some and runs together, but crumbles on drying. Plants produce stalks but cotton dies some.

No. 11,393. Subsoil to 11,392. Depth 5″-12″. This soil is a dark sandy loam.

W. T. Lawrence, Coryell County. Experiment 485. Plot is located one mile west of Mound, on well drained upland. The soil is poor and mixed in character, with a light sandy surface soil and a red clay subsoil. The land has been in cultivation ten years and the average yield has been fifteen bushels an acre. The land was formerly timbered. Corn was planted April 15 in plots of nine rows each, three feet apart

and 125 feet long. All plots were cultivated alike. All plots damaged by drouth. Plots 3, 4, 5, 6, and 7 were fine until they began to tassel, and then burned up due to drouth. Harvested corn October 10.

Description of soil No. 11,416. Depth 0″-6″. Located one-half mile west of Mound, Coryell County. This is upland, sand and clay of moderate fertility, in cultivation for ten years. Plowed under green crop in April with good effect. This soil is a light gray, mottled red sandy loam, stands wet weather very well but not dry weather, crumbles on drying. Produces medium stalks.

No. 11,417. Subsoil to 11,416. Depth 6″-12″. This soil is a reddish brown mottled clay.

H. A. Porter, Denton County. Experiment 486. Plot is located six miles west of Lewisville, on a well drained level upland. The surface soil is a moderately fertile light sand with a red clay subsoil. The land has been cultivated for forty years, most of the crops being cotton. The average yield of corn has been fifteen bushels per acre. Manure has been used for fertilizer with good results. Corn was planted on April 6 in two rows to the plot, four feet apart and 560 feet long. Fertilizer was applied with a drill. All plots were cultivated alike. Crop was harvested on September 10.

Victor B. Smith, Donley County. Experiment 487. Plot one mile northeast of Clarendon, on a well drained lowland. The soil is of good fertility and uniform in character with a dark mixed sandy surface soil and a clay subsoil. The land had been cultivated for seven years. It produces kafir, maize or cotton well, and the average yield of cotton is one-half bale an acre. Corn was planted on April 8 in four rows to each plot, three and one-half feet apart and 100 yards long. All plots were worked alike. A short drouth damaged all the corn while in tassel, and hail also damaged crop. Corn was harvested September 27.

Description of soil No. 11,285. Depth 0″-12″. Located one mile northeast of Clarendon, Donley County. This is good soil, not uniform in fertility. This land has been in cultivation ten years. Small quantities of fertilizer on spots increased the yield. The yield is better in wet seasons than in dry seasons, but the yields are good if the crop is thinned out and well cultivated. This soil is a dark gray sandy loam, packs, runs together and clods on drying.

No. 11,286. Subsoil to 11,285. Depth 12″-24″. This soil is a dark gray sandy loam.

Aubrey Gist, Erath County. Experiment 488. Plot is located eight miles south of Bluff Dale, on well drained second bottom. The surface soil is moderately fertile, dark red, uniform loam. The subsoil is a red clay. The land has been in cultivation for ten years and the average yield has been twenty-five bushels an acre and thirty-five bushels of oats. Corn was planted on March 20 in four rows per plot, four feet apart and 280 feet long. Fertilizer was applied in drill. All plots were cultivated alike and damaged by storm. Germination was not good and varied from plot 1 to plot 10, as if the natural fertility

of the field increased gradually from plot 1 to plot 10. Harvested on October 15.

Robert T. Wade, Erath County. Experiment 489. Plot is located five miles north of Stephenville in a level upland with small drainage. The soil is moderately fertile, uniform, mixed dark sand with red clay subsoil. The land has been in cultivation twelve years, and the average yield has been one-third bale of cotton an acre. Corn was planted on March 25 with sixteen rows per plot, three feet apart and seventy feet long. All plots were cultivated alike, fertilizer was applied by hand, and crop was harvested on November 1. The entire plot suffered from drouth.

William C. Frochner, Gonzales County. Experiment 490. Plot is located twelve miles west of Gonzales on an upland with little drainage. The surface soil is a moderately fertile mixed soil of black land sand. The subsoil is a yellow clay. The land has been cultivated for twelve years and the average yield of corn is twenty-six bushels an acre. Corn was planted on March 15 in four rows per plot, four feet apart and 208 feet long. The fertilizer was applied in a furrow by hand, then plowed under. All plots were cultivated four times and the middle was plowed once. The plots were all damaged by early wet weather and late drouth. Corn was harvested on October 7.

Description of soil No. 11,388. Depth 0″-7½″. Located twelve miles west of Gonzales, Gonzales County. This is upland mesquite and of moderate fertility. It produces one-third bale of cotton or thirty bushels of corn per acre. This land has been cultivated sixteen years. Not uniform in fertility. Four or five loads of manure applied with good results. Cotton yields better than corn in dry seasons, but corn does better in wet seasons. This soil is a brown sandy loam. In spots the soil packs, runs together, and cotton dies. Plants produce medium sized stalks.

No. 11,389. Subsoil to 11,388. Depth 7½″-19½″. This soil is a brown sandy loam.

W. A. Ray, Gregg County. Experiment 492. Plot is located west of Longview, on a well drained second bottom. The surface soil is of good fertility and is a uniform chocolate loam. The land has been cultivated one year and similar land makes an average yield of twenty bushels of corn and one-half bale of cotton an acre. Corn was planted on May 14 in plots of four rows each, four feet apart and forty yards long. The fertilizer was applied by hand. All plots were cultivated alike and all were damaged by storm and drouth in July and August. Corn was harvested on October 29.

Description of soils Nos. 11,247-11,248. Depth 0″-12″. Located six miles west of Longview, Gregg County. This is fertile bottom land. The land has been in cultivation from one to three years. The soil is light, brown, silty loam, does not pack, run together, or clod. Plants produce good stalks and cotton does not die.

T. A. Callaway, Jack County. Experiment 494. Plot one and one-half miles from Jacksboro, on well drained, first bottom. The soil is of good fertility, and is a uniform light red loam with a clay subsoil. The land has been cultivated for twenty-five years and the average yield has been thirty bushels of corn. Corn was planted in one row plots, rows seven feet apart and 190 yards long. The fertilizer was applied by hand in furrow and mixed with soil by harrow. All plots were damaged slightly by storm. Corn was harvested on September 21.

A. G. Smith, Jack County. Experiment 495. Plot is located seven miles west of Jacksboro, on a well drained upland. Surface soil is moderately fertile, mixed, dark sandy loam with a red clay subsoil. The land has been in cultivation for thirty or thirty-five years and the average yield is one-third of a bale of cotton and twenty bushels of corn an acre. Corn was planted on April 2 in three row plots, rows three and one-half feet apart and 140 yards long. Fertilizer was applied by a planter. All plots were treated alike. All were damaged by hail and part of the stand was washed out by early rains.

Description of soil No. 11,337. Depth 2″-5″. Located two and one-fourth miles north of Burwick, Jack County. This is rolling, moderately fertile. No fertilizer used. A very little barnyard manure used with good results. Plowed under green crop last fall for first time. Stands dry weather well. Soil is a yellowish brown sandy loam, packs, runs together, and clods on drying.

No. 11,338. Subsoil to 11,337. Depth 4″-12″. This soil is yellow sandy loam.

Will F. Pickett, Lampasas County. Experiment 496. Plot is located one-half mile west of Lometa, on well drained upland. The surface soil is a moderately fertile, uniform light loam, contains enough sand barely to scour plow. The subsoil is a whitish substance like ashes. The land is virgin prairie, broken sixteen months ago. The average yield is twenty bushels an acre. Corn was planted on March 14 in three row plots, five and one-half to six feet apart and seventy-five yards long. Fertilizer was applied by hand in shallow trenches opened beside the growing corn. The stand was uniform and about seventy-five per cent of normal. Plot 9 was slightly damaged.

James H. Christopher, Matagorda County. Experiment 497. Plot is located one mile from Bay City, on fairly well drained upland. The surface soil is uniform, moderately fertile, light colored, sandy loam, with a yellow clay subsoil. It has probably been cultivated for twenty years and the average yield is twenty bushels an acre. Corn was planted on April 7 in eight rows per plot, four feet apart and seventy yards long. The fertilizer was distributed by hand in furrow and then mixed. All plots were cultivated alike, first harrowed, then cultivated with shovels, hoed, cultivated twice with sweeps, then once with large sweeps. The whole crop was damaged by storm. The stand was about sixty-five per cent. normal.

Description of soil No. 11,304. Depth 0″-6″. Located one mile

south of Bay City, Matagorda County. This is upland of moderate fertility and poor drainage. It produces thirty-seven bushels of corn per acre. This land has been cultivated twenty or forty years. Fertilizer used in cooperative experiment last year increased yield. Soil is a gray sandy loam. Soil packs, some clods and runs together, some is improving. Soil becomes wet and crop is inclined to drown out in wet seasons. In dry seasons soil dries and cracks.

No. 11,305. Subsoil to 11,304. Depth 6″-12″. This soil is a gray clay loam.

F. A. Scott, Mills County. Experiment 498. Plot is located six miles northeast of Goldthwaite, on a well drained land. The surface soil is a mixed black soil. No fertilizer has been used except barnyard manure. Corn was planted on April 7 in plots of three rows, four feet apart and 140 yards long. The fertilizer was applied with a cotton planter. The plots were cultivated alike. The weather was too dry at planting time and at silking time.

Description of soil No. 11,394. Depth 0″-7″. Located six miles northeast of Goldthwaite, Mills County. This is second bottom land. Soil is dark gray mottled, white gravelly loam. In wet seasons in spots turns yellow or whitish. Crops die in dry seasons. Soil crumbles on drying. Produces fair stalks.

No. 11,395. Subsoil to 11,394. Depth 7″-14″. This soil is gray mottled, white, gravelly loam.

John A. Miller, Palo Pinto County. Experiment 499. Plot is located two miles south of Salesville, on well drained upland. The surface soil has poor fertility. It is a uniform clay loam with a three-inch layer of sand on top, and a sticky red clay subsoil. The land has been in cultivation for thirty years, and has been allowed to run too long in cotton and corn. The average yield has been one-eighth bale of cotton and fifteen bushels of corn. Corn was planted on April 1 in four rows, four feet apart and 280 feet long. Fertilizer was applied broadcast. A ditch ran next to plot 10. The rest of the plots were not affected by different conditions. The crop was affected by a long wet spell in May and June.

E. O. Redford, Palo Pinto County. Experiment 500. Plot located three miles south of Mineral Wells, on well drained upland. Surface soil is moderately fertile mixed sand, loam and clay of a light red color. The land has been in cultivation for over thirty years and the average yield is from fifteen to thirty bushels of corn an acre. Commercial fertilizer and barnyard manure have been used before. Corn was planted on March 13. The fertilizer was applied broadcast by hand and covered with a drag. All plots were cultivated alike. Chinch bugs damaged all plots. Some hills in plots 2 and 3 washed out. All plots were damaged by drouth when in silk and tassel.

J. T. Tisdale, Red River County. Experiment 501. Plot is located one and one-fourth miles southwest of Avery, on well drained ridge

upland. Surface soil is a uniform dark sandy soil of good fertility, with a light gray subsoil. The land was formerly used for pasture and has been cultivated two years. The average yield is twenty-five bushels of corn and one-half bale of cotton. The land was broken in December and corn was planted on April 6 in six row plots, rows three and one-fourth feet apart, and seventy yards long. The fertilizer was applied in hills by hand. Plot 6 lost eleven hills through moles. Plot 1 was next to a cross fence, and first row was poor. Peas were planted between all rows except in plot 3.

J. T. Cochran, Rusk County. Experiment 502. Plot twelve miles south of Henderson on well drained upland. Surface soil is moderately fertile gray, uniform soil with a yellow subsoil. The land has been in cultivation for fifteen years and the average yield is fifteen bushels an acre. Corn was planted on March 15 in four row plots, rows three and one-half feet apart and seventy yards long. Fertilizer was applied on April 20. Land was bedded in February and planted in furrows.

Description of soil No. 11,266. Depth 0″-6″. Located twelve miles southwest of Henderson, Rusk County. This is upland, level, moderately fertile. Produces fifteen bushels corn or one-third bale of cotton per acre. The land has been cultivated twenty years. One hundred and fifty pounds fertilizer used yearly with good effect. Poor yields in wet seasons and good in dry seasons. Soil a yellowish gray clay loam. Soil packs, runs together and clods on drying. Poor stalks, and cotton dies.

No. 11,267. Subsoil to 11,266. Depth 6″-12″. This is light yellow clay loam.

J. M. Ashley, Rusk County. Experiment 503. Plot is located twelve miles south of Henderson, on well drained second bottom. The surface soil is a uniform red loam of fairly good fertility. The subsoil is a red clay. The land has been in cultivation for twenty years and the average yield is fifteen bushels of corn an acre and one-half bale of cotton. Ground was broken in January and planted level to corn on March 1. The plots had two rows, four feet apart and 190 yards long. Plots were not damaged by anything except drouth. Plots 4, 6 and 7 were earlier than the rest, but all were cut short by drouth.

Description of soil No. 9932. Depth 0″-10″. Located twelve miles southwest of Henderson, Rusk County. This is second bottom, moderate fertility. It produces twenty bushels of corn or one-third bale of cotton per acre. The land has been cultivated seventy-five years. Stands drouth well. Soil is reddish sand. Does not pack, clod or run together. Plants do not die. Stalks are too small. Cottonseed meal and acid phosphate cause large increase in yield.

No. 9933. Subsoil to 9932. Depth 10″-18″. This soil is reddish brown sand.

T. G. Speights, Sabine County. Experiment 504. Plot is located four miles north of Hemphill, on well drained upland. The surface soil is uniform, moderately fertile, light red, sandy loam with a clay sub-

soil. This land has been in cultivation for twenty years, and the average yield has been twenty bushels of corn an acre. Corn was planted on February 18, in four row plots, four feet apart and forty yards long. All plots were damaged by storms and insects. Plot 2 was affected by especially unfavorable influences.

A. D. Winston, Smith County. Experiment 505. Plot is located one-half mile north of Whitehouse, on well drained upland. Surface soil is a moderately fertile, red sand mixed with some clay, with a clay subsoil. The land has been in cultivation for ten years, and the average yield is twenty bushels of corn an acre. Corn was planted on March 10 in one row plots, rows eight feet apart and 200 yards long. The fertilizer was applied by hand before planting. The plots were all cultivated alike.

H. D. Farquhar, Waller County. Experiment 506. Plot located eight miles southwest of Hempstead, on very well drained, gently sloping, upland. The surface soil is a moderately fertile, uniform, sandy soil with a clay subsoil. The land has been in cultivation for twenty years and was formerly prairie. The average yields are 600 pounds of seed cotton and eighteen bushels of corn. Corn was planted on March 1 in four row plots, three and one-half feet apart and 315 feet long. Fertilizer applied by hand before planting. All plots were damaged by chinch bugs and bud worms. Stand was cut down from 105 hills per plot to seventy-eight by bud worms.

R. E. Leonard, Wise County. Experiment 507. Plot is located just east of Rhome, on well drained upland. The soil is moderately fertile black clay and is uniform. The subsoil is a clay of lighter color. The field has been in cultivation for thirty years and has been planted in wheat and oats mostly. The average yields have been twenty bushels of corn, one-half bale of cotton, and fifty bushels of oats. Corn was planted on March 1 in five row plots, three and one-half feet apart and eighty-three yards long. These plots were all planted and cultivated alike. The plot was on Johnson grass land. Plots 1, 2, and 3 were damaged by unfavorable influences.

Description of soil No. 9690. Depth 0″-8″ or 9″. This is upland, moderate. Does not overflow. It produces ten to twelve and one-half bushels of wheat per acre. The land has been cultivated thirty years. No fertilizer or manure has been used. Sticky, and poor yield in wet seasons. Soil is black clay, cracks, does not pack or run together, crumbles on drying, produces fair stalks, and cotton does not die.

No. 9691. Subsoil to 9690. Depth 8″-9″ to 12″-14″. This soil is a brownish black clay.

Leroy C. Swenson, Wise County. Experiment 508. Plot was located two and one-half miles southeast of Rhome, on well drained rolling prairie. The surface soil is black, uniform, soil. The land has been in cultivation for thirty years, and the average yield has been thirty-five bushels of corn per acre. Corn was planted on March 25 in two

row plots, three and one-half feet apart and 205 yards long. The stand was poor, although it was replanted. This was caused by birds pulling it up. The plots were all plowed three times and hoed twice.

Description of soil No. 11,306. Depth 0″-6″. Located two miles southeast of Rhome, Wise County. This is rolling prairie, good soil, no overflows. The land has been cultivated thirty-five years. No fertilizer used on this land. Soil black clay. Soil packs, runs together and clods on drying. Plants produce good stalks in good seasons. Cotton, corn, and alfalfa die.

No. 11,307. Subsoil to 11,306. Depth 6″-12″. This soil is also a black clay.

S. A. King, Wood County. Experiment 509. Plot is located six miles northeast of Quitman, on well drained upland. The surface soil is a very nearly uniform, moderately fertile sandy loam, with a clay subsoil. This field has been in cultivation thirty years, and the average yield is twenty bushels corn and 400 pounds of cotton an acre. Corn was planted on April 5 in four row plots, four feet apart and ninety yards long. The fertilizer was applied by hand. All plots were cultivated alike. All plots were damaged slightly by washing.

Description of soil No. 11,251. Depth 0″-7″. Located seven miles northeast of Quitman, Wood County. This is upland, rolling, moderately fertile. It produces sixteen to twenty bushels of corn per acre. The soil is a yellowish gray sandy loam, runs together but crumbles on drying. Plants produce good stalks and cotton does not die. Produces good crop in wet seasons if cultivated properly.

No. 11,252. Subsoil to 11,251. Depth 7″-12″. This soil is a yellowish clay loam.

DETAILS OF EXPERIMENTS—CORN, 1916

W. O. Berry, Homer, Angelina County. Experiment 510. Ten miles south of Lufkin, Texas. Land is moderate and mixed in character, has never had any legume turned under, nor any fertilizer used, produces twenty bushels of corn and forty bushels of oats, in cultivation two years. The land has been plowed shallow and poorly cultivated. Surface soil is black clay, subsoil gray, with poor drainage conditions. Land broken in December, corn planted on May 10 and harvested September 29, fertilizer applied by hand. Four rows per plot, three and one-half feet apart and 140 yards long. Land broken in fall and sowed in oats during the winter. All cultivated alike. Plot 1 did not have so good a start as the others.

Table 37.—Corn, bushels per acre, 1916.

Laboratory No.		Nothing.	150 lbs. acid phosphate.	200 lbs. cottonseed meal.	150 lbs. acid phosphate. 100 lbs. cottonseed meal, 50 lbs. nitrate of soda.	150 lbs. acid phosphate, 200 lbs. cottonseed meal.	150 lbs. acid phosphate, 200 lbs. cottonseed meal, 20 lbs. sulphate of potash.	150 lbs. acid phosphate, 200 lbs. cottonseed meal, 50 lbs. sulphate of potash.	Nothing	10 loads manure.	10 loads manure, 150 lbs. acid phosphate.
510	W. O. Berry, Angelina Co	17 1	23 6	17 0	24 1	24 1	25 1	23 0	16 1	22 6	24 6
511	Jeff McDowell, Colorado Co	30 0	34 5	32 0	36 0	33 0	36 6	40 4	32 6	46 1	47 0
512	D. Geo. M. Hiles, Colorado Co	4 0	9 1	5 0	11 4	14 3	14 3	12 3	6 3	13 0	22.4
513	Ed. T. Cox, Eastland Co	5 7	11 4	10 6	9 0	7 1	7 0	7 6	8 9	11 9	
514	J. J. Hair, Henderson Co	9 3	10 3	16 1	12 4	12 7	12 0	12 0	4 4	12 6	13.4
515	Robt. D. Halsell, Palo Pinto Co.	21 4	21 0	24 4	27 0	24 4	25 6	24 0	26 1	2 6	20.1
516	M. Sloan, Walker Co	32 4	33 7	37 0	39 0	41 6	44 0	47 0	48 1	50 6	52.0
	Average	16 6	20.5	15.5	22.7	22.6	23.5	23.7	20.3	22 8	28.8

Jeff McDowell, Rock Island, Colorado County. Experiment 511. One mile east of Rock Island. Land is moderate upland and uniform in character, produces twenty bushels of corn, in cultivation five years. Surface soil is a dark sandy loam, subsoil a clay. Fair drainage. Land was flat broken in fall and bedded, corn planted on February 28 and harvested in August. Fertilizer was applied by hand. Three rows per plot, three feet apart and 140 yards long. All plots damaged by a wind storm.

Dr. Geo. M. Hiles, Rock Island, Colorado County. Experiment 512. One and one-half miles south of Rock Island. Soil is moderate upland and uniform in character, in cultivation several years. Surface soil is a dark sandy loam, subsoil a clay. Fairly good surface drainage. Land broken in January, corn planted March 9 and harvested September 15. Fertilizer applied by hand in furrow where corn was planted. Two rows per plot, three feet eight inches apart and 640 yards long. All plots were cultivated alike. Season was good.

Description of soil No. 12,988. Depth 0″-8″. Located one and one-half miles from Rock Island, Colorado County. This is uniform moderate upland, rolling. Soil is a brownish gray silty loam, runs together in wet seasons, in dry seasons mellows up and holds moisture well. Soil packs, runs together, crumbles on drying and clods. Plants produce good stalks.

No. 12,989. Subsoil to 12,988. This soil is a brownish gray silty loam.

Ed T. Cox, Eastland, Eastland County. Experiment 513. Three miles west of Eastland. Soil is moderate second bottom and uniform in character, in cultivation five years, used as a truck patch and not fertile. One crop of peas was turned under. It produces twenty bushels of corn. Surface soil is a sandy loam, very light chocolate in color, subsoil is a good quality of clay. Drainage is fair. Land broken in December, corn planted on March 24 and harvested on September 12.

Fertilizer was scattered by hand, and mixed with plow. Four rows per plot, three and one-half feet apart and 285 feet long. Land harrowed twice before planting, once after planting, and plowed four times. All plots damaged fifty per cent. by drouth on account of late planting. Plot 1 was outside and suffered worst.

J. J. Hair, Athens, Henderson County. Experiment 514. Five miles northeast of Murchison. Soil poor, hilly land, mixed sand in character, in cultivation nineteen years. Soil stands drouth pretty well, produces ten to fifteen bushels of corn. Surface soil is a sandy loam. Subsoil is a mixed yellow sand and clay two and three feet deep. Drainage is good. Land broken in January, corn planted in March and harvested in August. Four rows, four feet apart and 280 feet long. Planted in middle breaker furrow and scratcher run over it after coming up, then plowed every two weeks. All plots damaged by chinch bugs, especially 7 and 8.

Description of soil No. 12,959. Depth 0"-4". Located five miles southeast of Murchison, Henderson County. This is uniform and moderate upland and rolling. The land has been cultivated eighteen years. No fertilizer or manure has been used. No green crop was plowed under. Soil is a gray sand. Crops poor in seasons that are too wet. Crop and soil are good with a little dryness. Plants do not produce a good stalk. Cotton dies some.

No. 12,960. Subsoil to 12,959. Depth 4"-8". This soil is a gray sand.

C. W. Haskell, Mineral Wells, Palo Pinto County. Experiment 515. Soil is a moderate upland, spotted in character, produces thirty-eight or forty bushels of corn. In cultivation three years, previously in post oak. Surface soil is a black and light red sand, some also dark. Subsoil is a red clay. Drainage is good. Corn planted on March 20 and harvested September 8. Fertilizer was applied after crop was up by opening a furrow and applying by hand. Two rows per plot, four feet apart and 560 feet long. All plots cultivated alike. All damaged by dry weather.

Description of soil No. 12,961. Depth 0"-14". Located three miles west of Mineral Wells, Palo Pinto County. This is fairly uniform in fertility, moderate rolling upland. It produces corn and cotton fairly well. A part has been in cultivation thirteen years, balance four years. The only fertilizer used was that in an experiment last year. Very little manure has been used but with good results. Soil stands wet weather well if plowed and does fairly well if cultivated, shallow or harrowed in dry seasons. Soil is a brown clay loam and packs in places and produces good stalks. Cotton stalks do not die.

No. 12,962. Subsoil to 12,961. This soil is a brown clay loam.

M. Sloan, Phelps, Walker County. Experiment 516. One-half mile south of Phelps. Soil is a moderate upland, uniform in character. In cultivation eight years. Produces twenty bushels of corn an acre. Surface soil is a light sand, and subsoil a red clay. Drainage is good.

Land broken in December, corn planted March 24 and harvested October 2. Fertilizer applied by drill. Ten rows per plot, distance between rows seven feet, length of rows 140 feet. All plots cultivated alike. None damaged by any outside influences.

Description of soil No. 13,184. Depth 0″-10″. Located one-half mile south of Phelps, Walker County. This is uniform, good land. It produces thirty bushels of corn, and one-half bale of cotton per acre. The land has been in cultivation eight years. The soil is a light brown sandy loam, does not pack nor run together. It crumbles on drying. Cotton does not die in dry seasons. The plants produce good stalks.

No. 13,185. Subsoil to 13,184. Depth 10″-20″. This soil is also a light brown sandy loam.

DETAILS OF EXPERIMENTS—CORN, 1917

P. A. Rawlings, Mesquite, Dallas County. Experiment 517. Farm six miles southeast of Dallas. Soil is good and uniform, yields twenty-five to thirty bushels of corn, one-half bale of cotton, and forty bushels of oats, in cultivation thirty to fifty years. It is upland prairie, between sand and black soils. Surface soil is a dark gray clay loam. Subsoil is a clay. Drainage is good. Land was broken in December, corn planted April 5 and harvested October 25. Fertilizer was applied in furrow in front of planter. Two rows per plot 220 yards long four inches apart. All plots were cultivated alike. One outside row in plot 1 made nothing. Poor season for corn.

Table 38.—Corn, bushels per acre, 1917.

Laboratory No.		Nothing.	150 lbs. acid phosphate.	20 lbs. cottonseed meal.	150 lbs. acid phosphate, 100 lbs. cottonseed meal, 50 lbs. nitrate of soda.	150 lbs. acid phosphate, 200 lbs. cottonseed meal,	150 lbs. acid phosphate, 200 lbs. cottonseed meal, 20 lbs. sulphate of potash.	150 lbs. acid phosphate, 200 lbs. cottonseed meal.	Nothing.	10 loads manure.	150 lbs. acid phosphate, 10 loads manure.
517	P. A. Rawlins, Dallas Co.	12.9	12.9	12.1	11.9	12.9	12.6	12.3	10.9	9.9	11.3
518	J. A. Desel, Galveston Co.	11.9	19.3	26.4	25.7	22.3	22.9	26.9	25.6	26.6	21.4
519	C. C. Bock, Jack Co.	2.6	1.4	5.9	6.6	5.0	4.9	7.6	3.0	.9	.9
520	S. A. King, Wood Co.	18.1	20.6	24.7	25.4	23.9	20.6	23.9	25.0	37.0	29.4
	Average	11.4	13.6	17.3	17.4	16.0	15.3	17.9	16.1	18.6	15.8

J. A. Desel, Dickinson, Galveston County. Experiment 518. Soil good and uniform, yields thirty bushels of corn. Peas and peanuts have been turned under. The past four years the land has had a four-year rotation system of onions, peas, corn, and peanuts. It has been in cultivation twenty years. Barnyard manure has been used with good results. Surface soil is twelve inches, and deep black wax. The subsoil is a yellow clay, very tight. It drains well. Land broken in September, corn planted on March 8 and harvested on August 20. Fertilizer applied in drill and cultivated to mix fertilizer. Two rows

per plot, 420 feet long, four feet apart. All plots cultivated alike. The season was very dry. Plots 3, 4, and 7 stood drouth best.

C. C. Bock, Perrin, Jack County. Experiment 519. Farm one-half mile northeast of Perrin. Soil moderate and uniform, low valley land, which yields eighteen bushels per acre, in cultivation twenty years. Surface soil is a black loam, subsoil a light colored clay. Well drained but practically level. Land broken December 1, corn planted on April 2 and 3 and harvested on August 20. Four rows per plot, seventy yards long and four feet apart. Fertilizer applied by drill. All plots cultivated alike. All damaged by hail. Plots 9 and 10 were affected by hot south winds and dry season.

S. A. King, Quitman, Wood County. Experiment 520. Farm six miles southwest of Quitman. Soil is uniform and mixed upland, in cultivation forty years, produces fifteen bushels of corn an acre. Surface soil is sandy and light red. Land broken in December, corn planted March 20 and harvested October 13. Fertilizer applied by hand. Four rows per plot, ninety yards long and four feet apart. All plots worked alike.

DETAILS OF EXPERIMENTS—IRISH POTATOES, 1911

Will F. Lade, Anderson County. Experiment 534. Eight miles southwest of Frankston. It is moderate soil, somewhat mixed, produces fifteen to twenty bushels of corn or one-fourth bale of cotton, in cultivation about forty years. It is upland soil, slightly rolling, with a light sandy loam surface soil and a red clay subsoil. Land not previously fertilized. Potatoes planted March 1 and harvested June 2, 1911, fertilizer applied with cotton planters. Two rows per plot, three and one-half feet apart and 280 feet long. All plots were treated alike.

Table 39.—Irish potatoes, bushels per acre, 1909.

Laboratory No.		Nothing—5	300 lbs. acid phosphate.	300 lbs. acid phosphate, 400 lbs. cottonseed meal.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 20 lbs. muriate of potash.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 100 lbs. muriate of potash.
521	Velasco, Brazoria Co.	32.5	32.5	40.0	26.1	33.2
522	Ennis, Ellis Co.	25.3	29.3	30.0	31.1	32.8
523	Seabrook, Harris Co.	72.1	114.3	149.2	158.9	123.2
524	Greenville, Hunt Co.	15.3	12.5	17.8	18.2	12.5
525	Hempstead, Waller Co.	46.7	51.8	100.0	106.1	112.1
526	Winnsboro, Wood Co.	28.5	61.4	84.2	92.8	104.3
	Average	36.7	50.3	70.2	72.2	50.3

Table 40.—Irish potatoes, bushels per acre, 1910.

Laboratory No.		Nothing—0	Nothing—5	300 lbs. acid phosphate.	300 lbs. acid phosphate, 400 lbs. cottonseed meal.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 20 lbs. muriate of potash.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 100 lbs. muriate of potash.	5 tons cow pen manure.
527	Frankston, Anderson Co	.....	33.2	39.6	88.9	98.9	117.1	.....
528	Eagle Lake, Colorado Co	30.7	48.5	35.0	38.6	57.1	50.1	.....
529	Sanger, Denton Co	.....	12.8	12.1	20.0	17.8	17.1	.....
530	Cuero, DeWitt Co	.....	41.4	48.2	75.0	64.1	71.4	.....
531	Ennis, Ellis Co	.....	35.7	46.4	50.0	47.8	48.2	44.6
532	Donnie, Freestone Co	.....	8.2	7.8	10.3	9.8	11.1	.....
533	Thornton, Limestone Co	13.5	15.3	31.4	41.8	43.5	40.3	.....
	Average	22.1	27.8	31.5	46.4	48.4	50.8	44.6

Table 41.—Irish potatoes, bushels per acre, 1911.

Laboratory No.		Nothing.	Nothing.	300 lbs. acid phosphate.	300 lbs. acid phosphate. 400 lbs. cottonseed meal.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 20 lbs. sulphate of potash.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 100 lbs. sulphate of potash.	20 loads manure.
534	Will Lade, Anderson Co	.....	.....	40.0	70.0	68.7	60.0	.....
535	James Calvert, Bexar Co	111.3	126.7	145.3	142.0	119.0	162.3	129.0
536	Edward Hart, Brooks Co	63.3	.....	77.0	86.7	79.7	107.0	.....
537	E. C. Brown, Camp Co	7.0	.....	15 0	43.3	45.3	48.3	.....
538	T. M. Morris, Denton Co	36.0	43.3	56.7	63.3	65.3	78.3	45.0
539	W. Rucker, Erath Co	43.3	47.3	50.0	86.7	84.3	103.3	.....
540	J. T. Mallard, Falls Co	14.3	.....	23.3	50.0	62.3	67.7	.....
541	Sam Neel, Guadalupe Co	53.7	.....	67.0	88.7	90.0	90.7	.....
542	H. Cloud, Henderson Co	33.3	.....	45.3	83.3	86.7	83.3	.....
543	J. H. Murphy, Hopkins Co	66.7	76.7	73.3	60.0	80.0	83.3	53.3
544	W. C. Eisenbach, Lee Co	.....	.....	56.7	54.7	46.7	45.3	58.3
545	C. R. Lamar, Rusk Co	26.3	4.0	47.3	95.0	59 3	73.3	26.7
	Average	45.5	59.6	58.1	76.1	73.9	83.6	62.5

James Calvert, Van Raub, Bexar County. Experiment 535. Land located one and one-half miles west of Van Raub. Uniform soil, produces twenty bushels of corn or one-third bale of cotton. In cultivation fifteen years. The soil is loose and easy to work, being lowland, first bottom soil, and black land. Surface soil is black, eight inches deep, with a light red subsoil, sticky in wet weather. Irish potatoes planted February 25 and harvested June 3, 1911. Three rows, three and one-quarter feet apart and 270 feet long. Hoed once, cultivated once, cultivated through the middles with sweep and once with three shovels, making three cultivations in all. Plot 7 was damaged by grubs. Harvested 105 pounds of small potatoes from all the plots also.

Edward Hart, Falfurrias, Brooks County. Experiment 536. Adjoining the town of Falfurrias on the north side. The soil is uniform

in character, produces one bale of cotton or fifty-five bushels of potatoes. In cultivation three years, one year in onions, one year in potatoes, and one year in cotton. It is second bottom land, dark loam surface soil with dark yellowish clay subsoil. Land broken in September and harrowed during the fall. Mixed fertilizer did not give good results on adjoining land, but cottonseed meal did. Potatoes planted February 2 and harvested April 12, 1911. Fertilizer placed in bottom of furrows eight inches deep. Four rows per plot, three feet apart and 140 feet long. Irrigated three times and cultivated twice with five-tooth cultivator and twice with sweeps. The ground was kept as level as possible. The potatoes were not quite matured when dug, and the stand on all plots were practically perfect.

E. C. Brown, Pittsburg, Camp County, Route 5. Experiment 537. Located two miles north of Pittsburg, on moderately uniform soil, which produces twenty bushels corn and one-third bale of cotton. In cultivation from twenty to thirty years. It is level upland, with a light sandy loam surface soil and a red clay subsoil. No fertilizer has been used before. Potatoes planted February 15 and harvested June 15, 1911, in plots of three rows, three feet apart and 300 feet long. Cultivated three times by plowing. All plots injured by dry weather.

F. M. Morris, Aubrey, Denton County, Route 2. Experiment 538. Moderately uniform upland, producing twenty-five bushels of corn or one-eighth bale of cotton, in cultivation thirty-five years. It was originally post oak and heavily timbered land. It is moderately rolling land with a white sandy surface soil, fourteen to eighteen inches deep, and a red clay subsoil. No fertilizer was ever used. Irish potatoes planted March 17 and harvested June 8, 1911. Fertilizer was applied in drills before planting. Two rows per plot, three and one-half feet apart and 320 feet long. All plots were put in fine condition, and were well cultivated. All damaged by drouth. Did not have a good rain from planting until digging. The plot that received the manure was at a disadvantage on account of the dry weather.

W. Rucker, Lingleville, Erath County, Route 1. Experiment 539. Land located ten miles northwest of Lingleville. It is good uniform land, producing one-half bale of cotton or thirty bushels of corn. In cultivation twelve years. It is level upland with sandy loam dark surface soil and a dark subsoil. Barnyard manure gives good results. Potatoes planted February 27 and harvested June 1, 1911. Two rows two and one-half feet apart and 320 feet long. Land plowed early in the fall and harrowed two or three times. Dry weather injured the yield to a great extent.

J. B. Mallard, Rosebud, Falls County, Route 1. Experiment 540. Irish potatoes planted February 13 and harvested May 1, 1911. Fertilizer applied in drills ten days before planting and bedded on. Four rows per plot, forty inches apart and 144 feet long. Plots were plowed twice and hoed once. There was an ant bed in plot 2. Plot 4 matured

better than the rest and there were less culls. It was so wet that the potatoes had to be dug early.

Description of soil No. 5100. Depth 0″-11″. Located five and one-half miles east of Travis, Falls County, Powell survey. The sample was taken from the southeast corner of a thirty-acre tract on the north side of Powell league, 4800 varas from the bank of the Brazos river. This is good bottom land, and has good drainage. It is brown in color and is a sandy loam, locally known as "dark loam sand." The native vegetation is Spanish mulberry and beggar louse. It holds moisture well in dry weather and does not pack, crumble, crack or wash. Dirt washes onto it. It has not been fertilized either by green crops or manure. The chief crops are corn, cotton, potatoes, peanuts and cow-peas. Corn turns yellow in wet weather. The yield per acre is one-half bale of cotton, thirty bushels of corn or 100 bushels of potatoes.

No. 5101. Depth 11″-25″. This is a subsoil to 5100. This is a yellow sandy soil, and does not contain hard lumps.

Samuel Neel, Seguin, Guadalupe County. Experiment 541. Sandy mesquite land, produces thirty bushels of corn or one-fourth bale of cotton. In cultivation twenty years. It is upland soil with a sandy loam surface soil and a clay subsoil. Fertilizer has been used with good results. Potatoes planted February 22 and harvested May 6. Fertilizers applied by hand in rows and harrowed in. Two rows per plot, three feet apart and 280 feet long. Cultivated every ten days on the level. Potatoes planted on plots 3, 4, and 5 were hurt some by heavy frost after being cut the day before. The potatoes planted were mixed and not true to name.

C. H. Cloud, Murchison, Henderson County, Route 1. Experiment 542. Located five miles northwest of Murchison, on uniform land, which produces about twenty-five bushels of corn. In cultivation ten years. It has made forty bushels in both sweet and Irish potatoes. It is upland soil but what is known as table land, between Kickapoo and Cra and Creamerland creeks, with a dark sandy loam surface soil and a yellow sand subsoil. It was broken in the fall and again in the first part of February. No commercial fertilizers have ever been used, but stable manure has given satisfactory results. Irish potatoes planted February 2 and harvested May 29. Fertilizer put in furrows and listed light. Two rows per plot, four feet apart and 450 feet long. Plowed three times and hoed once. Crops were all damaged by some kind of a blight.

Description of soil No. 5098. Depth 0″-6″. Located three-fourths of a mile north of Kickapoo creek and five miles south of Murchison, Henderson County, R. Giles survey. This is nearly level upland, slightly sloping to the northeast and is considered moderately fertile. It produces 1000 pounds of cotton and twenty bushels of corn per acre. The principal crops are corn, cotton, potatoes, and peas. No fertilizer has been applied until this year. The native vegetation is crab grass and careless weeds. The soil is a gray sand, which becomes very boggy

in wet seasons and fluffy light in dry seasons. It does not pack, crack or wash. The land has been under cultivation for two years. The sample represents forty acres of the farm. No green crops have been plowed under, but a heavy application of manure gave fine results.

No. 5099. Depth 6″-12″. Subsoil to 5098. This is a yellow sand.

I. H. Murphy, Ridgeway, Hopkins County, Route 1. Experiment 543. Good, uniform land, produces fifty bushels corn or three-fourths bale of cotton. In cultivation fifteen years. It was originally heavy timber land and has a black sandy loam surface soil laid down by overflows, with a black waxy subsoil. Land broken in the spring. Irish potatoes planted March 7 and harvested June 10, 1911. Fertilizer drilled on each side of the rows after planting. Four rows per plot, four feet apart and 140 feet long. Land flat broken in January, layed off with shovel, covered with turning plow and cultivated with sweep. The vines of the fertilized potatoes were much larger than those not treated, and the tubers more numerous, but smaller than those not treated. The treated potatoes came up very irregularly. Some matured in a month, while others in the same row were green when dug. It is probable that the weather conditions did not give a fair test. The stand of the rows was estimated at fifty per cent.

Description of soil No. 5959. Depth 0″-12″. Located six miles south of Ridgeway, in the south part of the sulphur river bottom, W. M. Work headright, Hopkins County. The sample was taken in the southwest corner of I. H. Murphy's tract of land. This is bottom, made land, and is considered quite fertile. Formerly it was subject to overflow. It produces two-thirds bale of cotton and fifty bushels of corn per acre. The principal crops are corn and cotton. The only fertilizer that has been applied is that in the cooperative experiment of 1911. The native vegetation is grass and wild onions. The soil is a dark brown clay, which packs and breaks into clods in wet weather and is loose and loamy in dry seasons. Small, irregular cracks, sometimes fifteen feet in depth, are formed on drying. The surface drainage is good, the underdrainage is not so good. The soil does not wash, and dirt does not wash onto it. The land has been cultivated for fifteen years. The sample represents fifty acres on the farm and thousands of acres in the county. No green crops have ever been plowed under and no manure has been applied. Good water can be had at twenty-five feet.

No. 5961. Depth 12″-24″. Subsoil to 5960. This soil is black clay.

W. C. Eisenbach, Giddings, Lee County. Experiment 544. Located three miles southeast of Giddings, on moderate soil, uniform in character, producing about thirty bushels of corn or one-half bale of cotton, in cultivation about twenty-five or thirty years. It has a dark sandy surface soil with a clay subsoil. No fertilizer used except barnyard manure, which gave good results. Potatoes planted March 13, 1911, harvested June 2. Two rows per plot, three and one-half feet apart and 300 feet long. Plowed three times with a cultivator, four shovels. First damaged by drouth and then by too much rain.

C. R. Lamar, Henderson, Rusk County. Experiment 545. Two miles northeast of Henderson, on moderately uniform land, which produces ten bushels of corn. Cultivated fifteen years, but not continuously. It is classed as Norfolk sandy loam and is black when wet and gray when dry, and has a yellow clay subsoil. Four years ago this plot gave fine potatoes with a complete fertilizer applied at planting time. Fifty pounds of nitrate of soda per acre were applied when in bloom. Planted February 18 and harvested June 1, 1911. Fertilizer applied by hand. Four rows per plot, three feet apart and 210 feet long. Patch weeded over February 28, second harrow March 16. April 5, weeded just before rain. April 10, three inches of rain in one-half hour. Land washed and packed badly. May 1, cultivated with twenty-four-inch sweep. May 1, sprayed with acetate of lead for Colorado beetle. Plot 1 had more humus than any other. Plants came up early and all grew well from start. Plot 2 had a ninety per cent. stand, but many plants died during the season. Plot 3, stand ninety per cent., had a good appearance during the season and had a better appearance than any except plots 5 and 7. Plot 4, stand ninety per cent. Plot 5, stand seventy-five per cent. Plants were vigorous all season and yielded largest, finest and firmest of all plots. Potatoes smoothest and best shaped. Yield of marketable potatoes not equal to the general crop, which was fertilized more heavily, but they were better sized. Formula is ideal but application should be heavier. Plots 6 and 7 were planted just seven days later than the others, as work was interrupted by hard rain, which was followed by hard freezes for some days. Plot 6 had fifty per cent. stand, but plants were weak and succumbed to every misfortune. Rains injured them, work seemed to set them back and they were easily injured by drouth. The Colorado beetle lived on them and destroyed them almost entirely before the other plots were attacked. Plot 7 used green stable manure with much litter, as all of the well rotted manure had been used up. Owner was afraid to put it under the potatoes and put it on top and then covered it with dirt. Stand twenty per cent. and potatoes large and watery.

DETAILS OF EXPERIMENTS—IRISH POTATOES, 1912

William Lade, Frankston, Anderson County. Experiment 546. Located northeast of Frankston, on moderately good soil, mixed. Produces twelve to fifteen bushels of corn and one-fourth bale of cotton. In cultivation with intervals for forty years. Upland, light sandy loam with red clay subsoil and sufficient drainage. Irish potatoes planted February 27, harvested June 4. Fertilizer applied by hand. Two rows per plot, four feet apart and 280 feet long. Vines badly infected with bugs two weeks before harvesting. The stand was damaged by excessive rains and cold weather.

Description of soil No. 5945. Depth 0"-8". Located eight or nine miles northeast of Frankston, Anderson County, center of field south from residence, G. B. Gray survey. This is a sandy soil, locally known as "Norfolk sandy loam." It is hard in dry seasons and packs some

in wet seasons. It cracks a little and washes a little, but dirt does not wash off. No fertilizer has been used, however. Manure on one-half acre gave good results. The native vegetation is crab grass. The chief crops are cotton and corn. One acre produces fifteen bushels of corn or from one-fourth to one-half bale of cotton.

No. 5946. Depth 10″-20″. This is a subsoil to 5945. It is a white sandy soil.

Table 42.—Irish potatoes, bushels per acre, 1912.

Laboratory No.		Nothing—1	Nothing—8	300 lbs. acid phosphate.	400 lbs. cottonseed meal.	300 lbs. acid phosphate, 600 lbs. cottonseed meal.	300 lbs. acid phosphate, 400 lbs. cottonseed meal.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 20 lbs. sulphate of potash.	300 lbs. acid phosphate, 40 lbs. cottonseed meal, 100 lbs. sulphate of potash.	20 loads manure.	300 lbs. Thomas phosphate.	400 lbs. rock phosphate.
546	William Lade, Anderson Co..	32.7	33.3	.....	63.0	71.3	63.3	74.3	.....	77.3	.....	.....
547	S. L. Horne, Anderson Co...	38.3	46.0	39.3	65.0	97.0	80.7	96.3	83.7	.....	38.3	.....
548	G. K. Cannon, Atascosa Co..	18.3	15.3	27.7	42.3	80.0	62.7	65.0	62.7	27.3	17.3	.....
549	L. A. Hollis, DeWitt Co.....	33.3	43.3	30.0	25.0	55.0	46.7	46.7	35.0	20.0	.....	.....
550	F. P. Dunkle, Donley Co....	10.0	9.3	11.7	11.0	13.3	13.3	14.0	14.7	10.0	.....	12.3
551	M. B. Parker, Gonzales Co...	16.3	17.7	24.7	32.0	26.3	21.3	30.0	24.7	18.0	.....	12.7
552	Ralph Martin, Harris Co....	41.7	66.0	126.0	53.0	60.3	63.7	58.0	95.3	18.7	.....	12.3
553	L. C. Lehmann, Washington Co.....	102.0	103.3	104.0	151.0	160.0	188.0	171.7	144.3	123.0	.....	113.0
554	H. C. Hausen, Wharton Co..	102.0	72.7	89.3	62.7	72.7	67.0	71.0	61.3	89.7	76.0	.....
	Average.....	43.8	45.2	56.0	56.1	70.7	67.4	69.7	65.2	48.0	43.9	30.1

S. L. Horne, Frankston, Anderson County. Experiment 547. Located two miles east of Frankston, on moderately good soil of uniform character, which produces fifteen bushels of corn and has been in cultivation a long time. It has been devoted to corn and cotton growing with cowpeas in corn occasionally. It is lowly situated upland of a light sandy soil with reddish sand subsoil and good drainage. The crop of potatoes was planted February 22, harvested June 6 and 7. Fertilizer applied by hand in furrow beside the row. Three rows per plot, three feet apart and 243 feet long. Land broken in January, harrowed twice, cultivated once with "Denerie" cultivator and twice with heel sweep. No manure was applied to plot 9, as the field was too wet to haul across at the time for application.

G. K. Cannon, Loire, Atascosa County. Experiment 548. Located eighteen miles west of Floresville, on moderately good and uniform soil, which produces fifteen to twenty bushels of corn and 500 pounds of seed cotton. In cultivation twenty-nine years. It was previously covered with post oak timber and sedge grass. It is Orangeburg fine sandy loam with a red subsoil having a clay foundation. Land broken by January 1, Irish potatoes planted March 6 and harvested June 10. Fertilizer applied by hand, four rows to the plot, four feet apart and 140 feet long. All plots cultivated alike by thorough flat cultivation with a diverse cultivator. Plots 8, 9, and 10 were damaged. The entire crop was damaged by plant lice.

Description of soil No. 4310. Depth 0″-12″. Located in the southeast corner of Bexar County, one mile northwest from the corner, eighteen miles from Floresville, S. J. Kenny survey, abstract 412, cert. 695, survey 1367. The sample was taken 200 yards south from the northwest line and fifty yards east of a ditch through the field. This is upland soil, moderately fertile and well drained. It produces one-third bale of cotton and fifteen to twenty bushels of corn per acre. No fertilizer has been applied. The native vegetation is sage grass and post oak. This is a dark brown sandy soil, locally known as "post oak loam," probably Norfolk fine sand. It packs and crumbles on drying. It does not crack, and washes very little. Crops grow slowly in the early spring. The soil is soggy in wet seasons. It holds moisture well and crops grow well in dry seasons. The land has been under cultivation for twenty-seven years. The sample represents two-thirds of the farm and one-thirtieth to one-fortieth of the county. No green crops have ever been plowed under. Manure was applied ten years ago with good results. Sweet potatoes rot in the ground. Formerly cotton died. The land formerly produced much heavier yields.

No. 4311. Depth 12″-24″. Subsoil to 4310. This is a light brown sand.

L. A. Hollis, Edgar, DeWitt County. Experiment 549. Located one-half mile north of Edgar, on fairly uniform soil, which produces 500 pounds of seed cotton and twenty bushels of corn, and has been in cultivation probably twenty-five years. It is black land with red clay subsoil, and good drainage. Land broken in January, potatoes planted March 9, harvested July 22. Fertilizer applied by hand. Two rows per plot, three and one-half feet apart and 400 feet long.

F. P. Dunkle, Lelia Lake, Donley County. Experiment 550. Located one mile west of Lelia Lake. The soil is good and uniform, and produces fifteen bushels of corn, one-half bale of cotton, twenty bushels of oats, and twenty-five bushels of kafir. In cultivation five years. It is upland and has had a limited application of manure. It is a dark sandy loam with a lighter sand subsoil. Drainage good. Land broken in February, crop of Early Triumph potatoes planted April 8, harvested July 24. Fertilizer applied by hand in furrow. One row per plot, three feet apart and 510 feet long. All plots had the same treatment, being plowed and hoed twice. The season was dry throughout, with no rain in July. Crop was short on account of drouth.

Description of soil No. 7102. Depth 0″-12″. Located one mile west of Lelia Lake, Donley County. This is upland, moderately fertile but not uniform in fertility. It is used mainly for garden truck. No fertilizer has been applied and no green crops have been plowed under. The soil is a reddish brown sandy loam which does not pack, run together or clod. It crumbles on drying. The land has been under cultivation for five years. The sample represents three acres of the farm.

No. 7103. Depth 12″-24″. Subsoil to 7102. This soil is a reddish brown loam, lighter than the surface soil.

M. B. Parker, Harwood, Gonzales County. Experiment 551. Located four miles south of Gonzales, on moderately good soil, which produces fifteen bushels of corn and one-fourth bale of cotton, and has been in cultivation fifteen years. The land is hilly. It is a light sandy loam soil with red clay subsoil, and good drainage. Irish potatoes planted February 15, harvested May 8. Fertilizer applied by hand. Two rows per plot, three feet apart and 373 feet long. Plots were well cultivated. Season was unfavorable for potatoes.

Ralph Martin, Katy, Harris County. Experiment 552. Located four miles south of Katy, on moderately good land, part of it mixed and the rest uniform. Produces seventy-five bushels of potatoes and twenty bushels of corn. In cultivation five years. Previously prairie land. The surface soil has a chocolate color with spots of white and black, subsoil a reddish yellow clay. Drainage is good to excellent. Three rows per plot, three feet apart and 187 feet long. Land cultivated February 8, disked and dragged. Part of crop was planted March 4, the rest May 18. Harvested June 3 and June 12. Cultivated three times; stand perfect.

L. C. Lehmann, Brenham, Washington County. Experiment 553. Located five miles west of Brenham, on moderately good and uniform soil, which produces twenty-five to thirty bushels of corn, one-fourth to one-half bale of cotton, and has been in cultivation from twelve to thirty years. Previously post oak, black jack and hickory timber land, and some black prairie land with a growth of sedge grass. The soil is black and gray with whitish subsoil on black land and red on sandy land. Fair drainage conditions. Land broken in November and December. Manure and cottonseed have been used with good results. Irish potatoes planted February 27 and harvested June 20. Fertilized by hand. Two rows per plot, three feet three inches apart, and ninety-three yards long. First cultivated with harrow as potatoes were coming up; next hoed lightly, and later given two plowings. Green Mountain potatoes were planted and the weights given were marketable potatoes.

H. C. Hansen, Danevang, Wharton County. Experiment 554. Located eight miles northwest of Markham, on uniform and moderately good land, which produces twenty-five bushels of corn and one-half bale of cotton. In cultivation fifteen years; previously pasture. It is upland, sandy loam soil with clay subsoil and fair drainage. Acid phosphate and potash have given good results on corn. Land broken December 15, potatoes planted May 1 and harvested September 20. Fertilizer applied by hand. One row to plot, four feet apart and 560 feet long. Land was bedded in fall. Fertilizer was put between the beds in the spring and the land rebedded on it. Plot 1 was an outside row and the vines were shaded by cotton. Potatoes were harvested early, as the season was dry and weevils were setting to work.

DETAILS OF EXPERIMENTS WITH IRISH POTATOES, 1913

G. M. Thames, Paige, Bastrop County. Experiment 555. Located four miles west of Paige, on moderately good upland soil, nearly uniform, which produces one-third bale of cotton, and has been in cultivation twenty years. It has a red loam surface soil with red clay subsoil, and good drainage. Land broken in January. Fertilized by hand at time of planting. Two rows per plot, three feet apart and 100 yards long. Cultivated with four-shovel cultivator April 1 and with sixteen-inch shovel sweep stock April 21. Cold weather caused all plots to grow slowly.

Description of soil No. 7129. Depth 0″-8″. Located four miles west of Paige, Bastrop County. This is upland soil, moderately fertile, but not uniform in fertility. Lot manure was applied in 1912 with good results. The soil is a red loam, which packs and dries into crumbs. Plants produce a good stalk. Cotton does not die. The land has been cultivated for thirty years. The sample represents ten acres of the farm.

No. 7130. Depth 8″-18″. Subsoil to 7129. This soil is a reddish brown clay.

Table 43.—Irish potatoes, bushels per acre, 1913.

Laboratory No.		Nothing—1	Nothing—8	300 lbs. acid phosphate.	400 lbs cottonseed meal.	300 lbs. acid phosphate, 200 lbs. cottonseed meal, 100 lbs. nitrate of soda.	300 lbs. acid phosphate, 400 lbs. cottonseed meal.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 40 lbs. sulphate of soda.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 100 lbs. sulphate of potash.	20 loads manure.	300 lbs. Thomas phosphate.	800 lbs. hydrated lime.
555	G. M. Thames, Bastrop Co..	24.0	24.0	42.0	42.0	42.0	42.7	36.0	35.7	24.0	.....	18.7
556	J. W. Blackwell, Bastrop Co.	11.0	11.7	35.7	23.0	11.7	32.0	31.3	32.7	32.3	.....	30.0
557	O. J. Reynolds, Brown Co...	51.3	65.3	78.7	74.0	74.0	74.3	87.9	79.0	66.0	.....	.....
558	C. W. Stone, Cass Co.....	13.3	.....	38.0	38.3	43.3	42.3	48.3	48.7	126.7	.....	.....
559	L. McDuffy, Hardin Co.....	1.7	6.0	13.3	28.0	29.0	47.3	50.0	37.3	35.0	.....	.....
560	J. G. Henderson, Hopkins Co.	63.7	.....	89.7	81.7	145.3	105.7	101.7	97.7	.....	.....	.....
561	A. Ryall, Jasper Co.....	32.7	35.0	41.7	53.3	67.0	60.7	53.0	62.7	66.7	.....	62.0
562	John F. Bennett, Lavaca Co.	33.3	30.0	30.0	31.7	30.0	31.7	28.3	30.0	26.7	.....	.....
563	Clyde Simmons, Tarrant Co.	13.3	26.7	28.7	39.3	26.7	40.0	46.7	53.3	43.3	.....	32.7
564	Frank Svach, Waller Co.....	16.0	14.0	21.3	29.0	47.3	51.3	52.0	62.7	84.0	72.7	.....
565	L. L. Moore, Wharton Co....	59.3	60.0	66.0	64.7	72.3	72.0	76.3	77.3	77.0	.....	34.0
	Average.....	29.1	30.3	44.1	45.9	53.5	54.6	55.5	56.1	58.2	72.7	59.1

J. W. Blackwell, McDade, Bastrop County. Experiment 556. Located one mile from McDade, on good uniform, hilly upland which produces twenty bushels of corn or one-half bale of cotton. It has been cultivated about eight years, and previously was timber land. It has a light gray sandy surface soil with red clay subsoil and very good drainage. Potatoes were planted March 1 and harvested June 1. Applied fertilizer by hand. Four rows three and one-half feet apart to the plot and 140 feet long. Plots 3 and 4 were damaged by gophers.

Description of soil No. 7254. Depth 0″-6″ to 10″. Located one-half mile south of McDade, Bastrop County, Morteanes survey. This is rolling upland, some part of which washes a little. It is uniform in

fertility and considered very good for "post oak." It produces twenty bushels of corn and one-third bale of cotton per acre. No fertilizer has ever been applied until this year. Five years ago one shovel of cow manure was used to each hill of watermelons. The soil is a gray sand, some of which packs and runs together and the majority of which crumbles on drying. The crop yield is good in wet years. The soil stands drouth very well. Plants produce a good stalk. Cotton dies in spots. The land has been under cultivation for about eight years. The sample represents about three-fourths of the farm.

No. 7255. Depth 6″-10″ to 12″-22″. Subsoil to 7254. This soil is a mottled yellow and red clay.

D. G. Reynolds, Zephyr, Brown County. Experiments 557. Located four miles east of Zephyr, on good, uniform land, which produces one-third bale of cotton or twenty bushels of corn. It has been in cultivation four years; previously timber land. This is a light sandy soil with a stiff red clay subsoil. Drainage is good. Owner has used cottonseed meal with good results. Potatoes were planted February 21 and harvested June 5. Applied fertilizer by hand. Three rows, three feet apart per plot and 100 yards long. Fifty per cent. of all plots were killed by a freeze March 26. Rainfall was scarce.

C. W. Stone, Hughes Springs, Cass County. Experiment 558. Located one mile southwest of Hughes Springs, on poor and mixed upland. It produces one-fourth to one-third bale cotton, and has been cultivated for forty or fifty years. It has light sandy soil with clay subsoil, and good drainage. Land was broken in January. Fertilizer was used in 1911 with poor results. Potatoes planted February 28 and harvested June 9. Applied fertilizer by hand. Six rows per plot, three feet eight inches apart and thirty-five yards long. A very wet, cold spring and exceptionally destructive bugs affected the crop.

Description of soil No. 7149. Depth 0″-6″. Located one mile southwest of Hughes Springs. This is rolling land, moderately fertile and uniform in fertility. The soil is a light reddish brown sand, which packs, runs together, and crumbles on drying. Plants produce a fairly good stalk. Cotton does not die. The land has been cultivated for forty to fifty years. The sample represents two-thirds of the farm.

No. 7150. Depth 0″-6″. Subsoil to 7149. This soil is a yellowish red sandy clay.

L. McDuffy, Silsbee, Hardin County. Experiment 559. Located six miles northeast of Silsbee, on moderately good and uniform hilly land, which produces twenty bushels of corn. It is a dark coarse sandy soil with white coarse subsoil, and has good drainage. Land broken in December. Fertilizer never used before. Irish potatoes planted March 25 and harvested June 28. Fertilizer applied with cotton and corn planter. One row to plots three feet apart and 210 yards long. All plots were plowed twice. Potato bug injured all plots alike. This is not considered a fair yield as some rotted in the ground before harvesting.

J. G. Henderson, Birthright, Hopkins County. Experiment 560. Located ten miles from Sulphur Springs, on moderately good upland, which produces forty to fifty bushels of oats, and has been in cultivation forty years. Potatoes were planted March 5. Fertilizer was applied by hand and mixed with plow. Three rows, three feet apart to the plot and sixty-one yards long. Land had a cover crop before potatoes were planted. Plot 7 did not come up very well and those that came up did nothing.

Adrian Rydall, Jasper, Jasper County. Experiment 561. Located three miles west of Jasper. It is a moderately good spotted land, which produces fifteen bushels of corn or one-third bale of cotton, and has been in cultivation twenty years, and was very productive at first. It is a hilly, heavy dirt land with clay spots. Subsoil is white dirt and rests on red clay. Land broken in January. Irish potatoes planted February 28 and harvested June 20. Applied fertilizer in drill by hand. One row to plot, several feet apart and 420 feet long. Plots were prepared by breaking flat and harrowing thoroughly. Potatoes were planted on level ground and covered with disks, making a slight bed. Plot 4 was in an old terrace which caused it to be better. All plots were damaged by heavy rain storm in April.

Description of soil No. 7225. Depth 0″-9″. Located three miles west of Jasper, W. Thompson survey. This is a hilly land, moderate and uniform in fertility. It produces about one-third bale of cotton per acre. No fertilizer or manure has been used and no green crops have been plowed under. The soil is a yellow clay loam which packs, runs together, and dries into clods. It is locally called "stiff dirt." In wet weather it is hard to keep open and loose. It holds moisture in dry seasons, and does well where kept broken and stirred. Plants produce a good stalk. Cotton does not die. The land has been under cultivation for twenty-seven years. The sample represents seventy-five acres or more of the farm and about fifty per cent. of the county.

No. 7226. Depth 9″-18″. Subsoil to 7225. This soil is a yellow clay loam.

John F. Bennett, Hallettsville, Laraca County. Experiment 562. Located four miles south of Hallettsville, on moderately good land, mixed, which produces fifteen bushels of corn or 400 pounds of seed cotton. It has been in cultivation twenty-five years. It is second bottom land, slightly rolling. It is light sand and clay mixed soil, with red clay subsoil. It has good drainage. Land was broken in December and January. Fertilizer has never been used. Irish potatoes were planted March 28 and harvested June 1. Two rows per plot, three and one-half feet apart and forty yards long. Applied fertilizer with a distributer. Plot 8 was blighted worse than others. Nothing harmed the crop excepting the dry weather.

Clyde Simmons, Grapevine, Tarrant County. Experiment 563. Located four miles north of Grapevine. Land is moderately good and uniform, and produces 700 pounds seed cotton and twenty-five bushels

corn, and has been cultivated twenty years. It has always produced very well when not too dry. This is upland and has a dark red sandy loam with a stiff clay subsoil. It is well drained. Fertilizer never has been used. Land was broken January 1 and potatoes were planted March 1 and harvested June 17. Fertilizer was applied in furrow and mixed with turn plow. Two rows per plot, four feet apart and ninety yards long. Laid off rows with ten-inch shovel and covered with same plow running about six furrows to plow out middles. Potato beetles damaged all plots. Plots 1, 2, 3, and 4 were injured by cold.

Frank Svach, Brookshire, Waller County. Experiment 564. Located fourteen miles north of Hempstead, on moderately good spotted land, which produces twenty to twenty-five bushels of corn or one-fourth to one-third bale cotton. It has been in cultivation five years. Previously it was sour and wet. It is an upland gray sandy loam with a sticky clay subsoil. The drainage is good. Land broken as early as possible after Christmas. Fertilizer has been used with poor results on account of dry seasons. Irish potatoes were planted February 25 and harvested June 2. Land was fertilized by hand. Plots had two rows, forty-two inches apart and 280 feet long. Plots 1 and 8 were attacked by potato worm and by wet weather.

Description of soil No. 7237. Depth 0″-12″. Located eleven miles north of Brookshire, Waller County, Houston & Texas Central Railway survey, Section 5. The land is part rolling and part flat. It is moderately fertile in good seasons, though not uniform in fertility. It produces about one-third bale of cotton and twenty bushels of corn per acre. From 100 to 250 pounds per acre of fertilizer have been applied. In dry seasons 100 pounds per acre do best, and in wet seasons 250 pounds do best. Commercial fertilizer has been found to hurt the crop in dry seasons. Lot manure gives good results. The soil is a brown loam, which packs, runs together, and clods on drying. In wet seasons corn spoils and cotton rusts. In dry years the crop yield is poor. Plants produce good stalks in good seasons. The land has been under cultivation for thirteen years. A green crop of Soja beans and cowpeas was plowed under once with good results. The sample represents 174 acres of the farm.

No. 7238. Depth 12″-24″. Subsoil to 7237. This soil is a drab clay, slightly mottled with brown.

L. L. Moore, Wharton, Wharton County. Experiment 565. Located one mile northeast of Wharton. It is a good, uniform land, which produces forty-five bushels of corn. It has been in cultivation twenty-five to fifty years, and has been planted in corn and potatoes for the past five years. It is a first bottom, light sandy loam soil, and there is no variation in the soil for twenty feet deep. The drainage is natural and good. Land was broken in November. Fertilizer never had been used. Potatoes were planted February 21 and harvested June 10. The fertilizer was applied in drill by hand and mixed in with shovel plow. Two rows per plot, three feet apart and 363 feet long. Inten-

sive shallow cultivation was given. The season was so dry that fertilizer could be seen when harvesting.

Description of soil No. 7157. Depth 0″-13″. Located one mile northeast of Wharton. This is a good bottom land, locally called "coney." Cotton, corn, and potatoes are raised. No fertilizer has been applied until the present crop. No manure has been used and no green crops have been plowed under. The soil is a pinkish red clay, which packs and runs together to some extent, but does not clod, and crumbles on drying. Plants produce fairly good stalks. Cotton does not die. The land has been cultivated for thirty to forty years.

No. 7158. Depth 12″-24″. Subsoil to 7157. This is a pinkish red clay like the surface soil.

DETAILS OF EXPERIMENTS WITH IRISH POTATOES, 1914

H. L. P. Smith, Elgin, Bastrop County. Experiment 566. Located one mile east of Elgin, on good and fairly uniform soil, which produces thirty bushels of corn, and has been in cultivation fifteen years, being cropped almost continuously in corn. It is lowland bordering on a dry creek. The surface soil is a dark sandy loam made up largely of washings from the slope above, contains a fair amount of humus, and is deep. The subsoil is like top soil but heavier. Drainage is good. Land broken in January, Irish potatoes planted on February 19 and harvested on June 19. Fertilizer applied by hand. Two rows per plot, four feet apart and 280 feet long. All plots had rows opened and covered with shovel nearly level, then cultivated with sweep, throwing dirt on them. All plots damaged alike by wet weather.

Table 44.—Irish potatoes, bushels per acre, 1914.

Laboratory No.		Nothing.	300 lbs. acid phosphate.	400 lbs. cottonseed meal.	300 lbs. phosphoric acid, 200 lbs. cottonseed meal, 100 lbs. nitrate of soda.	300 lbs. phosphoric acid, 400 lbs. cottonseed meal.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 40 lbs. sulphate of potash.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 100 lbs. sulphate of potash.	Nothing.	20 loads manure.	300 lbs. acid phosphate, 20 loads manure.
566	H. L. Smith, Bastrop Co.	53	68	89	81	94	95	112	63	96	114
567	W. D. Coump, Lubbock Co.	28	73	69	137	94	77	51	32	30	46
568	A. L. Garden, Van Zandt Co.	17	22	35	50	43	48	48	17	52	37
569	M. K. Thomas, Van Zandt Co.	18	21	19	20	21	21	22	17	20	23
	Average	29	46	53	72	63	60	58	32	66	55
	1916										
570	F. A. Martin, Baylor Co.	25	37	45	54	62	51	62	28	41	59
571	Walter S. Lawrence, Galveston Co.	37	77	45	77	72	104	87	39	77	55
572	Elmer G. Bryan, Lamar Co.	30	70	82	93	95	102	104	75	98	122
	Average	31	61	57	74	76	86	84	47	72	79

W. D. Crump, Lubbock, Lubbock County. Experiment 567. Located ten miles northwest of Lubbock, on good and uniform soil, which produces twenty bushels of wheat, and has been in cultivation three years.

Land was used as truck patch. Land is in a depression, near a basin and receives washings from barn lots. The soil is a dark sandy loam. Drainage good. Land was broken in February, potatoes planted March 28 and April 20, and harvested August 3. Fertilizer applied by cotton-seed planter. One row per plot, three feet apart and 732 feet long. All plots cultivated alike. Plots 1, 7, 8, 9, and 10 were of Triumph variety and planted early. Plots 2, 3, 4, 5, and 6 were Waubonsia variety and were set out later.

Description of soil 9382. Depth 0"-12". Located nine miles west and three miles north of Lubbock, Lubbock County. It produces twenty bushels of wheat. Lies northeast of a lake that holds water several weeks after a big rain. Southeast corner is right at the lake. Soil good, uniform in fertility and has been cultivated for four years. Usually used as a truck patch. No fertilizer was applied except in this experiment. Soil is a black sandy loam. In dry weather if not cultivated, it gets very hard on top, but does not pack badly or crumble much on drying, runs together somewhat, and clods to some extent. Plants produce good stalks.

No. 9383. Subsoil to 9382. Depth 12"-24".

A. L. Gardner, Wills Point, Van Zandt County. Experiment 568. Located one mile north of Myrtle Springs, on moderate and uniform upland soil, which produces one-half bale of cotton, and has been in cultivation thirteen years. Land was timber land with post oak, hickory and black jack. Land has been planted in cotton except for one crop of sweet potatoes in 1913. It has a dark sandy surface soil and a clay subsoil. Land was broken in January and Irish potatoes planted March 10. Fertilizer was applied by hand. Two rows per plot, three and one-half feet apart and 300 feet long. All plots were cultivated alike, all damaged by heavy rains, and had about one-half stand.

M. K. Thomas, Wills Point, Van Zandt County. Experiment 569. One mile south of Myrtle Springs. The soil is good and uniform, upland hickory ridge. Produces one-half to three-fourths bale of cotton. In cultivation twenty-five to thirty years. Land poor for oats, seemingly being too loose. Barnyard manure, cottonseed and mixed fertilizers have been used. The surface soil is dark and sandy, needs humus and is benefited greatly by any fertilizer or cover crop. The subsoil is a clay. Drainage is good, very little inclined to remain wet, subirrigated. Land broken in early winter, potatoes planted March 12 and harvested June 16. Fertilizer was applied in drill under potatoes. Two rows per plot, three feet eight inches apart and 103 yards long. All plots cultivated alike. Wet weather interfered with plowing, planting and cultivating. All plots were damaged by wet weather. Several feet on the ends of plots 5, 6, and 7 were washed out.

J. W. Harris, Bryan, Brazos County. Experiment 573. Located ten miles north of Bryan on good and uniform upland. Average yield, three-fourths bale of cotton. In cultivation ten years. The surface soil is a good, deep, dark mellow sandy land with deep clay subsoil.

Drainage good. Land broken in January, Irish potatoes planted February 25 and harvested May 1. Fertilizer applied by hand. Two rows per plot, four feet apart and sixty yards long. Low yield for this country.

Table 45.—Irish potatoes, 1915.

Laboratory No.		Bushels per acre.
573	J. W. Harris, Brazos Co.	
	Nothing	30
	300 pounds acid phosphate	36
	400 pounds cottonseed meal	57
	300 pounds acid phosphate, 200 pounds cottonseed meal, 100 pounds nitrate of soda	58
	300 pounds acid phosphate, 100 pounds cottonseed meal	50
	300 pounds acid phosphate, 400 pounds cottonseed meal, 40 pounds sulphate of potash	52
	300 pounds acid phosphate, 400 pounds cottonseed meal, 100 pounds sulphate potash	47
	Nothing	30
	Twenty loads manure	40
	Acid phosphate, one load manure	42

DETAIL OF EXPERIMENTS WITH IRISH POTATOES, 1916

Walter S. Lawrence, Kemah, Galveston County. Experiment 571. The soil is moderate and uniform lowland, producing thirty bushels of corn per acre. In cultivation three years; prairie three years ago. Cotton was grown the first year and corn since, though one crop of peanuts was plowed under. The surface soil is a sandy loam, chocolate colored, the subsoil a yellow red clay. Land broken in December, potatoes planted March 24 and harvested May 16 to 20. Fertilizer applied in rows. Potatoes planted, covered with a little earth, fertilizer applied and covered with dirt. One row per plot, two and one-half feet apart and 720 feet long. Plowed by double shovel and harrowed twice, laid by with a buzzard wing sweep. All plots damaged by drouth.

W. E. Martin, Seymour, Baylor County. Experiment 570. The soil is moderate and uniform upland, producing twenty bushels of corn and one-third bale of cotton. In cultivation twelve or fifteen years. Legumes have been turned under, though no commercial fertilizer has been used. Manure has been applied with good results. The surface soil is a white sand and subsoil a red clay. Drainage fairly good. Potatoes planted February 17 and harvested June 2. Fertilizer applied by hand after planting. Two rows per plot, four feet apart and 280 feet long. Land bedded January 15, shallow broken and harrowed February 15. All plots cultivated alike.

Description of soil No. 13,728. Depth 0″-12″. Located just west of Kemah, Galveston County. This is sloping to the northwest.

No. 13,729. Subsoil to 13,728.

Elmer G. Bryan, Sumner, Lamar County. Experiment 572. Located near Paris, on moderate uniform, upland soil, which produces one-half bale of cotton or twenty-five bushels of corn. In cultivation four years. No legumes have been turned under nor fertilizer used. The surface soil is a light sand, the subsoil a clay. Good drainage. Land

broken in January, Irish potatoes planted March 23 and 24 and harvested June 28. Fertilizer applied by hand. Two rows per plot, four feet apart and 279 feet long. All plots cultivated alike. All rows damaged on one end by a heavy rain. Season hot and dry.

DETAILS OF EXPERIMENTS WITH IRISH POTATOES, 1917

R. C. Collie, Cleburne, Johnson County. Experiment 574. Located three miles east of Rio Vista, on moderate and uniform upland, producing one and one-fourth bales of cotton. Cultivated thirty years. It has a gray sandy surface soil and red clay subsoil. Good drainage. Irish potatoes planted February 20 and harvested June 15. Three rows per plot, three feet apart and eighty yards long. All plots were cultivated alike. Fertilizer applied with planter. No plots damaged.

Table 46.—Irish potatoes, 1917.

Laboratory No.		Nothing.	300 lbs. acid phosphate.	400 lbs. cottonseed meal.	300 lbs. acid phosphate, 200 lbs. cottonseed meal, 100 lbs. nitrate of soda.	300 lbs. acid phosphate, 400 lbs. cottonseed meal.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 40 lbs. sulphate of potash.	300 lbs. acid phosphate, 400 lbs. cottonseed meal.	Nothing.	20 loads manure.	15 lbs. acid phosphate, 20 loads manure.
574	R. C. Collie, Johnson Co.	7	27	40	80	83	87	93	8	53	73
575	M. J. Brewer, Palo Pinto Co.	111	123	157	153	157	167	172	172	173	173
	Average	59	75	99	117	120	127	133	90	113	123

M. J. Brewer, Oran, Palo Pinto County. Experiment 575. Located just west of Oran with moderate, uniform soil, which produces one-half bale of cotton and thirty bushels of corn, and has been cultivated fifteen years. It is second bottom land, with loam surface soil, and dark subsoil of a grade between sandy and waxy. Drainage good. Irish potatoes planted about May 1 and harvested October 21, with four rows per plot, ninety-nine yards long, and three feet nine inches apart. Fertilizer drilled in furrow, then bedded. All plots cultivated alike. Plots 6, 7, 8, 9, and 10 damaged by hogs. Dry season.

DETAILS OF EXPERIMENTS WITH SWEET POTATOES, 1911

Philip and August Endler, Kurten, Brazos County. Experiment 576. Land is located twelve miles southeast of Bryan, on spotted land of moderate fertility, producing twenty bushels of corn and two-fifths bale of cotton, in cultivation three years. It is upland soil with a black sandy surface soil and a red clay subsoil. With 100 pounds cottonseed meal to the acre land made three-fourths bale to the acre. With eight loads barnyard manure to the acre land made twenty-nine bushels of corn. Sweet potatoes planted March 23 and harvested October 17, 1911. Two rows per plot, three and one-half feet apart and 630 feet long.

They were hoed out and plowed three times. The weather was too dry during June, July and August for best results.

Description of soil No. 5937. Depth 0″-7″. Located twelve miles northeast of Bryan. This is upland soil of moderate fertility and good drainage, locally known as "sandy." It produces one-fourth bale of cotton and ten to twenty bushels of corn per acre. The principal crops are corn, cotton, potatoes, peas, sorghum, and peanuts. Fertilizer was used with some effect. The native vegetation is post oak and Spanish mulberry. The soil is a yellowish gray sand, which runs together and on drying crumbles and cracks. It washes in some places. Dirt does not wash onto it. It has been farmed for twenty to thirty years. The sample represents twenty acres of the farm. No green crops have been plowed under.

No. 5938. Depth 7″-15″. Subsoil to 5937. This soil is a light gray clay.

Table 47.—Sweet potatoes, bushels per acre, 1911.

Laboratory No.		Nothing—1	Nothing—8	300 lbs. acid phosphate.	300 lbs. acid phosphate, 400 lbs. cottonseed meal.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 40 lbs. sulphate of potash.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 100 lbs. sulphate of potash.	Manure.
576	Philip Eudler, Brazos Co	67.6	.....	338.2	370.9	473.4	303 3	.....
577	H. M. McKee, Cherokee Co	38.5	.....	63.3	58.9	48.4	76 7	69.1
578	J. C. Lambert, Freestone Co	90.9	.....	109.1	109.1	43.3	27.3	.....
579	Jas. Martyn, Harris Co	76.0	.....	97.8	96.4	108.7	134.5	.....
580	F. G. Holekamp, Kendall Co	229.8	.....	306.5	309.1	352.7	421.8	.....
581	J. C. Reese, Runnels Co	76.4	130.9	78.5	54.9	49.5	92.7	136.7
582	E. Bishops, Upshur Co	280.0	.....	240.0	309.5	389.8	400.0	.....
583	Lee Barnet, Wilbarger Co	252.0	.....	247.0	283.0	242.1	224.0	.....
	Average	138.9	130.9	185.1	199.0	213.5	210.0	102.9

A. M. McKee, Mt. Selman, Cherokee County. Experiment 577. Located one-half mile southwest of Mt. Selman, on uniform upland soil, producing about fifteen bushels of corn, and in cultivation about fifteen years. It has a light sandy surface soil and a yellow clay subsoil. Sweet potatoes set out July 15 and harvested November 25. Two rows per plot, four feet apart and 335 feet long. After the vines were set out there were five weeks of dry weather.

J. C. Lambert, Teague, Freestone County. Experiment 578. Located on uniform land, producing from twenty to thirty bushels of corn and from one-third to one-half bale of cotton. In cultivation six years. It is upland soil with a light sandy surface soil and a yellow clay subsoil. Land broken in January, sweet potatoes planted April 20 and harvested November 20. Four rows per plot, three and one-half feet apart and 160 feet long. Land broken in January, listed with four furrows in March, harrowed off just before planting, and then cultivated light every ten days until vines became too rank. He had some

very dry weather but on account of continuous cultivation the potatoes seemed not to suffer, and made the rankest growth of vines ever seen on the land, but practically failed in producing potatoes.

James Martyn, Seabrook, Harris County. Experiment 579. Sweet potatoes planted June 22, 1911, harvested November 15. One row per plot, four feet apart, 300 feet long. All plants were damaged the same by weevils.

F. G. Holekamp, Comfort, Kendall County, Route 1. Experiment 590. Good, uniform soil, used in cultivation five years; cotton two years, sorghum two years, and corn one year. It is hilly land with a dark loam surface soil and a red clay subsoil. Sweet potatoes planted June 9, 1911, and harvested October 24, 1911. Two rows, four feet apart and 280 feet long. The crop was grown by irrigation, water from a well being pumped between the rows. Four applications of water were made during the season.

J. C. Reese, Ballinger, Runnels County. Experiment 581. Land located two miles south of Ballinger, on moderate soil, in cultivation two years; too dry for the yield of crops. Surface soil is a white sand, and the subsoil is a red clay. Cattle have been grazed on the land, and there is some manure scattered over it. Sweet potatoes planted May 18 and harvested in November. Three rows, four feet apart and 208 feet long.

Eugene Bishop, Gilmer, Upshur County. Experiment 582. Land located four and one-half miles east of Gilmer, producing one-half bale of cotton or twenty-five bushels of corn. In cultivation six years, formerly timbered land. It is upland soil with a sandy loam surface soil, light in color, and a clay subsoil. Sweet potatoes planted April 12 and harvested October 17. Two rows per plot, three and one-half feet apart and 330 feet long. Land bedded three times, in January, in February, and in March. A good rain fell after the plants were set. There was no more rain until July 7, and the season was unfavorable.

Lee Barnett, Vernon, Wilbarger County. Experiment 583. Land produces one-half bale of cotton. In cultivation about twenty years. Upland soil with a sandy loam surface soil, light in color, underlaid with a clay at the depth of about thirty inches. Sweet potatoes planted May 9 and harvested October 24, 1911. Three rows, three and one-quarter feet apart and 270 feet long. Irrigated three times. Plot 5, which yielded 670 pounds, did not get as much water as the others. Owner thinks that the total yield would have been much greater had he irrigated another time.

Description of soil No. 4603. Depth 0″-12″. Located three-fourths mile southwest of Vernon, Wilbarger County, in the east of the northwest quarters of block 20, Texas favorite addition to Vernon. The land is good upland. It produces one-half bale of cotton per acre. Cotton, sorghum and fruit are the principal crops. No fertilizer has been applied. Mesquite grass is the native vegetation. The soil is a

brown sandy loam which sometimes in wet seasons forms a crust that prevents a good stand. It stands drouth well. The soil is friable, does not pack or wash, but it blows to some extent. It has been cultivated for about twenty years. About one-half the county is similar land. No green crops have been plowed under and no manure has been used.

No. 4604. Depth 12″-24″. Subsoil to 4603. This soil is a reddish brown sand. The subsoil at 24″-30″ is a heavy red clay, sometimes mottled with yellow, which is easily permeated by water.

DETAIL OF EXPERIMENTS WITH SWEET POTATOES, 1912

S. C. Folsom, Mound, Coryell County. Experiment 584. Located one-half mile east of Mound, on moderately good land, which produces one-half to one-third bale of cotton per acre. In cultivation twelve to fifteen years. It is second bottom land, with a light loam surface soil, and good drainage conditions. Sweet potatoes planted in May and June, harvested November 5. Fertilizer applied by hand. Three rows per plot, three feet apart and 175 feet long. It was continuously cultivated from March 1 to July 1. Plots 8 and 9 were damaged during growing season and 5 and 7 also were damaged. There was no rain from time of planting until October. The season being very dry, this is not considered as a fair test.

Table 48—Sweet potatoes, bushels per acre, 1912.

Laboratory No.		Nothing—1	300 lbs acid phosphate.	400 lbs. cottonseed meal.	300 lbs. acid phosphate, 600 lbs. cottonseed meal.	300 lbs. acid phosphate, 400 lbs. cottonseed meal.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 40 lbs. sulphate of potash.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 100 lbs. sulphate of potash.	400 lbs. phosphate rock.
584	S. C. Folsom, Coryell Co.	175.0	240.0	185.4	218.2	130.9	160.0	141.8	147.3
585	J. A. Phillips, Gregg Co.	70.0	120.0	140.0	149.8	130.0	90.0	90.0	140.0
	Average	42.5	180.0	162.7	184.0	130.5	125.0	115.9	143.7

J. A. Phillips, Gladewater, Gregg County. Experiment 585. Located five miles north of Gladewater, Gregg County, on good sandy land of uniform character, which produces fifty bushels of corn. In cultivation twenty-five years. It is sandy upland soil with clay subsoil. Sweet potatoes planted in May, harvested in November. Two rows per plot, four feet apart and 280 feet long. The plots were flat broken, bedded out with turn plow, fertilizer scattered in furrow and *listed on.*

Description of soil No. 7114. Depth 0″-10″. Located five miles north of Gladewater, Gregg County, Texas. This is rolling upland, which slopes to the south, and is known as "East Texas sandy land." It is moderately fertile and uniform. It produces twenty to twenty-

five bushels of corn per acre and seventy-five to 100 bushels of potatoes. Three hundred pounds of fertilizer per acre were applied in 1911. Five to six loads of manure per acre were used in 1910 and 1911, but the crops burned up on account of drouths. No green crops have been plowed under. This is a yellow sandy soil. It packs, runs together and crumbles on drying. The crop yield is average in wet years, but the soil does not stand drouth well. Plants produce good stalks. Cotton does not die. The land has been under cultivation for thirty years. The sample represents practically all the farm and seventy per cent. of the county.

No. 7115. Depth 10″-24″. Subsoil to 7114. This soil is a yellow clay.

DETAILS OF EXPERIMENTS WITH SWEET POTATOES, 1913

R. O. Carnes, Clyde, Calhoun County. Experiment 595. One mile west of Clyde, on moderately good, mixed land, which produces seventy-five bushels of sweet potatoes, and has been in cultivation six years. It is a small valley in upland, and has a dark sandy soil, with red and yellow clay subsoil. No fertilizer used before. Planted sweet potatoes May 16 and harvested October 8. Fertilizer distributed in listed furrow by hand and four furrows thrown on with two-horse turn plow. Two rows, five feet apart per plot and eighty yards long. Set in beds thirty inches apart. Diverse cultivator and spring tooth harrows used. Dirt thrown back with turn plow once and hoed twice. Cut worms and dry weather injured all plots.

Description of soil No. 7131. Depth 0″-6″. Located one mile west of Clyde, Calhoun County, B. B. B. & C. survey, Section 61. This is level valley upland, lower than the surrounding land, and is considered good. It is uniform in fertility. It produces one-half bale of cotton and seventy-five to 100 bushels of potatoes per acre. Cotton, potatoes and beans are grown. No fertilizer has been applied. About ten loads of manure per acre have been used. This soil is a grayish brown sand, which does not pack, run together or clod. It is locally called "blue clay pocket sand." In very wet seasons the yield is not so good. In average dry years the yield is better than in wet. A good crop is made with twenty-five-inch rainfall. Plants produce a good stalk compared with the local vegetation. Cotton does not die. The land has been under cultivation for eight years. The sample represents five acres of the farm and possibly 150 square miles in the county. No green crops have ever been plowed under.

No. 7132. Depth 6″-18″. Taken where clay comes to six inches of surface. Subsoil to 7131. This soil is a gray mottled with blue clay and sand.

No. 7133. Depth 6″-18″. Subsoil to 7131 where clay does not come to six inches of the surface. This sample is a grayish brown sand and clay.

Table 49.—Sweet potatoes, bushels per acre, 1913.

Laboratory No.		Nothing.	Nothing.	300 lbs. acid phosphate.	400 lbs. cottonseed meal.	300 lbs. acid phosphate, 200 lbs. cottonseed meal, 100 lbs. nitrate of soda.	300 lbs. acid phosphate, 400 lbs. cottonseed meal.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 40 lbs. sulphate of potash.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 100 lbs. sulphate of potash.	20 loads manure.	800 lbs. hydrated lime.
586	R.O. Carnes, Callahan Co.	242.2	229.1	218.2	258.9	220.0	250.9	260.4	282.2	260.0	229.8
587	S. L. Bryant, Freestone Co.	2·8.0	403.3	288.0	234.9	225.1	308.4	360.0	485.1	400 0	329.8
588	J. R. Walker, Lamar Co.	63.6	84.0	38.5	91.6	68.4	65.1	92.0	145.8	110.2	76.7
589	E. H. Watson, Polk Co.	103.6	174.5	122.5	107.3	159.3	167.3	131.6	149.8	193.4	.....
590	E. E. Jordan, Trinity Co.	54.5	52.7	78.2	114.5	65.5	109.1	105.5	110.2	101.8	110.9
	Average.	150.4	188.7	149.1	161.4	147.7	180.2	189.9	234.6	213.1	186.8

Samuel L. Bryant, Teague, Freestone County. Experiment 587. Located one mile west of Teague, on moderately good, uniform, second bottom, which produces fifteen bushels of corn and one-third bale of cotton. In cultivation forty years. Previously timber land. It is a light sandy loam soil with light clay subsoil. Drainage is very good. Land broken in February. Fertilizers used with good results. Sweet potatoes planted May 6 and harvested October 25. Fertilizer applied by hand. Four rows, three feet six inches apart per plot and fifty-two yards long. All plots treated alike, being cultivated with shovel and heel sweep.

Description of soil No. 7250. Depth 0″-6″. Located one mile west of Teague, Freestone County, Texas, Brewer survey. This is second bottom land, very nearly uniform in fertility. It produces fifteen bushels of corn, fifty to seventy-five bushels of potatoes, and one-fourth to one-third bale of cotton per acre. The soil is a brown sand. The crop yield is light in wet seasons and better in dry. The soil does not pack or run together. Plants produce an average stalk. Cotton does not die. The land has been cultivated for forty to fifty years. The sample represents fifteen to twenty acres of the farm and a small part of the county.

No. 7251. Depth 6″-18″. Subsoil to 7250. This soil is a gray sandy soil.

J. R. Walker, Blossom, Lamar County. Experiment 588. Located six miles northeast of Blossom, on moderately good, uniform upland, which produces one-half bale of cotton, and has been in cultivation twenty years. It is a light sandy soil with sandy subsoil grading into clay. Surface drainage is good. Sweet potatoes planted June 8 and harvested October 30. Fertilizer applied with cotton planter, four rows, four feet apart per plot and 291 feet long. Flat broken in February, bedded and rebedded twice, the last time about two weeks before planting. Cultivated three times. Dry weather caused almost a failure.

Description of soil No. 7173. Depth 0″-6″, and in another place 0″-12″. Located northeast of Blossom, Lamar County, W. F. Wright

survey. This is rolling upland, and is considered moderately fertile. It produces one-half bale of cotton and about twenty bushels of peanuts per acre. No fertilizer has been applied. This is light brown sandy soil. In wet seasons it holds too much water, but it stands drouth well. It packs, runs together if flat plowed, and crumbles on drying. Plants produce a medium stalk. Cotton does not die. The land has been under cultivation for twenty-two years. The sample represents nine acres of the farm.

No. 7174. Depth 6″-12″, and in a second place 12″-24″. Subsoil to 7173. This is a yellow, mottled with red, sandy clay.

E. H. Watson, Leggett, Polk County. Experiment 589. Located one and one-half miles from Leggett, on moderately good and uniform land, which produces fifteen bushels of corn or one-fourth bale of cotton. In cultivation twenty years. It is lowland, and has a dark colored surface soil with yellow clay subsoil. Poor drainage. Land broken on first of November. Sweet potatoes planted June 20 and harvested November 15. Fertilizer applied by hand. Six rows, three feet apart per plot and seventy yards long.

Description of soil No. 7163. Depth 0″-12″. Located one and one-half miles east of Leggett, Polk County. This is second bottom land, and is considered moderately fertile. The soil is light brown and sandy and is locally known as "chinney dirt." It runs together, gets hard, and forms into clods on drying. Plants do not produce a good stalk. Cotton does not die. The land has been under cultivation for thirty years. The sample represents three acres of the farm and one-fourth of the county.

No. 7164. Depth 12″-24″. Subsoil to 7163. This soil is also light brown and sandy.

DETAILS OF EXPERIMENTS WITH SWEET POTATOES, 1914

C. H. Morgan, Pleasanton, Atascosa County. Experiment 591. Located four miles west of Jordanton, on moderate and uniform soil, cultivated for two years. The soil has been neglected and weeds grew well. It is second bottom land, dark sandy soil with hard, white, sandy subsoil. Good drainage. Land broken in January. Sweet potatoes planted Aprii 17 and harvested November 2. Fertilizer mixed well in bottom of rows. Two rows per plot, three and one-half feet apart and 260 feet long. Land broken eight inches deep in January. All plots were cultivated alike and were equally damaged by rot. Only eighty feet of each plot harvested (for which allowance is made in table). Season very wet.

Table 50.—Sweet potatoes, bushels per acre, 1914.

Laboratory No.		Nothing.	300 lbs. acid phosphate.	400 lbs. cottonseed meal.	300 lbs. acid phosphate, 200 lbs. cottonseed meal, 100 lbs. nitrate of soda.	300 lbs. acid phosphate, 400 lbs. cottonseed meal.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 40 lbs. nitrate of potash.	300 lbs. acid phosphate 400 lbs. cottonseed meal 100 lbs. sulphate of potash	Nothing.	20 loads manure.	300 lbs. acid phosphate, 20 loads manure.
590	C. H. Morgan, Atascosa Co.	203.7	219.6	210.0	216.3	202.1	228.7	220.8	207.9	.....	.....
592	W. R. Durnell, Houston Co.	229.6	265.4	230.4	253.9	235.0	255.7	282.9	254.9	350.0	353.5
593	H. D. Howard, Johnson Co.	82.1	80.0	106.8	110.7	117.9	114.3	120.4	99.3	.....	.....
	Average.	171.8	188.3	200.4	193.6	183.0	199.6	208.0	187.4	350.0	353.5
	1915										
594	S. C. Folsom, Coryell Co.	141.4	207.1	185.7	235.7	207.1	250.0	257.1	153.6	*	*
595	G. E. Cunyas, Gregg Co.	255.4	319.3	313.9	422.1	422.1	476.4	569.8	216.1	.....	.....
596	W. N. Magee, Trinity Co.	150.0	172.5	178.2	165.0	210.0	190.0	210.0	152.9	155.0	164.3
	Average.	183.9	232.6	225.9	274.3	279.1	305.5	345.6	174.2	155.0	164.3

*Burnt up.

W. R. Durnell, Grapeland, Houston County. Experiment 592. Located six miles south of Elkhart, Texas, on good and uniform upland soil, which produces about thirty bushels of corn per acre. In cultivation three years. The soil is heavy gray mixed sand and loam, the subsoil is red clay, about fifteen inches below surface. Good drainage. Land broken in November, sweet potatoes planted on May 13 and harvested on November 13. Fertilizer applied by hand. Plowed eight inches deep in November, sowed in oats, which were plowed under in spring. Listed and relisted and planted reasonably flat. Three rows per plot, three feet two inches apart and seventy yards long. All plots cultivated alike. None damaged by storm or insects. Heavy rains in spring. No rain from early in May to July 25.

H. B. Howard, Alvarado, Johnson County. Experiment 593. Located four miles west of Alvarado, on good and uniform upland soil, which produces one-half bale of cotton. In cultivation two years. Soil is a dark loam with sandy subsoil. Drainage is good. Land broken in December, sweet potatoes planted May 15 and harvested October 1. Fertilizer applied by drill. Three rows per plot, three and one-half feet apart and seventy-five yards long. Land broken flat. No plots damaged. Plots 8, 9, and 10 were on the best soil. The season was dry.

DETAILS OF EXPERIMENTS WITH SWEET POTATOES, 1915

S. C. Folsom, Mound, Coryell County. Experiment 594. Located one and one-half miles east of Mound. Soil moderate and uniform in character, producing one-half bale of cotton. In cultivation fifteen years and reasonably productive. Second bottom land. The soil is dark with good drainage. The plot was located where the black soil and sand come together. Land broken in November and again in March; sweet potatoes planted in May and June. Fertilizer applied

by hand in deep cutter furrow. Four rows per plot, three and one-half feet apart and forty-six yards long. All plots cultivated alike. One rain in August. All plots damaged slightly by tropical storm.

Description of soil No. 11,396. Depth 0″-6″. Located one-half mile from Mound, Coryell County. This is second bottom land of Leon River; fertile. It produces thirty or forty bushels of corn or from one-half to three-fourths bale of cotton per acre. No fertilizers had been used. Soil becomes sticky in wet seasons and hardens in dry seasons. Soil is a dark gray sandy loam, which packs and clods Plants produce good staiks, but cotton dies in places.

G. C. Curyas, Longview, Gregg County. Experiment 595. Located seven miles east of Kilgore, on moderate and uniform upland soil. In cultivation forty years. Cultivated continuously since cleared. Produces average yield of ten bushels of corn. The surface soil is a sandy loam, light in color. The subsoil is a red clay. Commercial fertilizer, cottonseed meal and home mixture of phosphates and cottonseed meal have been used with good results. Land about exhausted by cotton. Sweet potatoes planted May 22 and harvested October 28-29. Four rows per plot, three and one-half feet apart and ninety yards long. Cultivated three times with sweeps. None of the plots were damaged.

W. N. Magee, Groveton, Trinity County. Experiment 596. Located four miles from Groveton, on good and uniform soil, which produces thirty bushels of corn. In cultivation three years. The soil is second bottom. The surface soil is a sandy loam, the subsoil a yellow sand, with good drainage. No fertilizer used before on this soil. Sweet potatoes planted June 7 and harvested November 10. Fertilizer applied in drill June 6 and plants set out June 7. One row per plot, three and one-half feet apart and 300 feet long. Plots flat broken and harrowed four times, and worked well. A portion of experiments was overflowed and badly washed.

DETAIL OF EXPERIMENTS WITH SWEET POTATOES, 1917

T. H. Brady, Livingston, Polk County. Experiment 597. Soil is moderate and uniform, new ground that has lately been pastured. It is upland, with white sandy surface soil and a clay subsoil, and has fairly good drainage. Sweet potatoes planted in April and harvested in October, with one row per plot, 285 yards long, three and one-half feet between rows. Fertilizer applied by hand ten days before planting. No plots damaged by storm or insects. No rain from planting to harvesting.

Table 51.—Sweet potatoes, bushels per acre, 1917.

Laboratory No.		Nothing.	300 lbs. acid phosphate.	400 lbs. cottonseed meal.	300 lbs. acid phosphate, 100 lbs. cottonseed meal, 100 lbs. nitrate of soda.	300 lbs. acid phosphate, 400 lbs. cottonseed meal.	300 lbs. acid phosphate, 400 lbs. cottonseed meal, 40 lbs. sulphate of potash.	300 lbs. acid phosphate, 400 lbs. cottonseed meal.	Nothing.	20 loads manure.	300 lbs. acid phosphate, 20 loads manure.
597	T. H. Brady, Polk Co	10	13.9	13.5	14.6	14.1	15.7	14.3	11.4	35.7	39.3
598	J. H. Hart, San Saba Co	39.3	37.5	49.3	51.8	46.8	62.8	51.8	46.7	59 0	64.6
	Average	20.2	25.7	31.4	33.2	30.5	39.3	33.1	29.1	47.4	47.0

J. H. Hart, Richland Springs, San Saba County. Experiment 598. Farm is five miles from Richland Springs, with moderate sandy soil, uniform. Produces fifteen bushels of corn per acre. Has been cultivated thirty years. Medium low land, with surface soil of light sandy clay two to three feet deep, and subsoil of light colored clay, and good drainage. Sweet potatoes planted about June 10 and harvested October 24 with two rows per plot, three feet apart and 120 yards long.

Table 52.—Comparison of soils.

	Cotton, 1911.																	
	G. H. Knellinger, Angelina Co., Experiment 346		R. L. Bush, Burnett Co., Experiment 349		J. H. Sandidge, Collin Co., Experiment 350		F. M. Morris, Denton Co., Experiment 351		S. L. Sealy, Lee Co., Experiment 352		R. Windsor, Leon Co., Experiment 353		W. M. Farmer, Milam Co., Experiment 354		C. M. Walls, Kaufman Co., Experiment 359		Paul Knauth, Williamson Co. Experiment 363	
	Surface 6010	Subsoil 6011	Surface 4336	Subsoil 4337	Surface 5953	Subsoil 5954	Surface 5943	Subsoil 5944	Surface 4326	Subsoil 4327	Surface 3367	Subsoil 3368	Surface 4749	Subsoil 4750	Surface 4328	Subsoil 4329	Surface 5966	Subsoil 5967
Per cent;—																		
Phosphoric acid	.06	.03	.11	.15	.22	.08	.06	.05	.04	.05	.02	.04	.08	.01	.06	.04	20	.16
Nitrogen	.05	.04	.05	.05	.24	.15	.05	.05	.05	.06	.05	.06	.02	.01	.07	.08	.18	.10
Potash	.12	.13	.41	.67	.53	.42	.08	.22	.28	.42	.16	.49	.04	.04	.26	.22	.71	.60
Lime	.09	.08	.22	.29	18.15	24.86	.24	.13	.15	.21	.17	.25	.07	.09	.28	.26	12.66	16.01
Magnesia	.14	.19	.34	.47	1.43	.24	.08	.12	.18	.26	.06	.33	.09	.06	.26	.27	.57	.30
Alumina and oxide of iron	1.46	3.40	5.69	9.14	10.54	6.34	1.23	5.40	6.20	14.12	3.50	19.60	.38	.43	3.30	4.34	14.22	13.93
Insoluble and soluble silica	94.98	93.96	89.64	82.82	42.47	38.59	96.35	90.98	89.60	77.04	.....	65.88	98.44	98.70	92.12	91.58	47.26	43.08
Loss on ignition	1.53	1.46	1.85	2.29	19.06	11.23	1.19	1.77	1.55	3.63	1.95	7.27	.66	.43	2.27	1.62	2.52	.....
Moisture	.65	.93	1.97	4.17	5.20	5.02	.46	1.18	1.52	4.26	.34	2.63	0.10	.09	1.59	1.94	7.66	.....
Parts Per Million;—																		
Active phosphoric acid	36.2	40.6	321.8	230.6	37.5	30.0	53.8	6.2	4.6	2.5	184.01	10.0	24.4	21.8	80.0	18.1	31.2	15.6
Active potash	168.7	87.5	50.2	73.7	266.2	72.2	155.0	126.2	180.6	176.2	158.5	.....	52.5	60.0	203.7	107.5	177.5	61.2
Acidity	4.00	40.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 52—Comparison of soils—Continued.

	Cotton, 1912.																	
	Edward Wersebe, Bexar Co., Experiment 364		C. A. Preston, Calhoun Co., Experiment 366		W. S. Jones, Cherokee Co., Experiment 367		G. Dittman, Comal Co., Experiment 369		J. M. Campbell Dallas Co., Experiment 370		Alvin Albers, Fayette Co., Experiment 373		Fritz Patscherwick, Kendall Co., Experiment 378		J. M. Gibbs, Madison Co., Experiment 382		J. D. Henson, Robertson Co., Experiment 383	
	Surface 7343	Subsoil 7344	Surface 7171	Subsoil 7172	Surface 7089	Subsoil 7090	Surface 7097	Subsoil 7098	Surface 7181	Subsoil 7182	Surface 7155	Subsoil 7156	Surface 7147	Subsoil 7148	Surface 7159	Subsoil 7160	Surface 7177	Subsoil 7178
Per Cent;—																		
Phosphoric acid	.03	.02	.29	.05	.09	.07	.09	.07	.12	.10	.02	.03	.04	.05	.03	.03	.02	.02
Nitrogen	.06	.03	.08	.10	.03	.04	.05	.02	.17	.13	.05	.03	.12	.11	.05	.05	.02	.04
Potash	.11	.08	.18	.49	.07	.12	.36	.28	.56	.42	.05	.09	.79	.76	.08	.14	.09	.10
Lime	.24	.52	.19	.27	.16	.11	30.67	31.38	19.95	29.96	.50	50	2.88	7.43	.23	.40	.09	.15
Magnesia	.09	.01	.16	.17	.14	.12	.83	.98	.60	.13	.09	.18	.34	.55	.15	.23	.06	.08
Alumina and oxide of iron	1.83	2.25	2.96	10.03	1.26	7.50	3.57	3.74	8.06	8.20	2.24	6.71	14.67	15.04	2.42	12.19	1.00	1.19
Insoluble and soluble silica	95.81	94.94	93.17	70.31	96.61	87.05	33.75	30.88	38.18	28.41	93.13	84.91	62.96	55.69	94.41	76.96	97.64	97.25
Loss on ignition	1.19	1.35	2.36	4.95	10.2	2.76	.....	.....	.....	.....	1.93	3.37	8.44	8.76	1.57	4.69	.76	8.6
Moisture	.27	.40	.76	4.18	.20	2.27	.....	.....	.....	.....	1.41	3.51	7.66	7.37	.85	5.25	.12	.18
Parts Per Million;—																		
Active phosphoric acid	23.7	18.1	24.7	8.7	46.7	6.9	24.6	8.1	11.2	7.5	22.8	16.2	28.7	8.1	43.4	39.4	27.1	16.2
Active potash	182.5	172.2	161.2	252.5	85.0	90.0	95.6	53.1	85.0	23.7	70.6	85.0	523.7	115.0	129.8	118.7	120.0	100.0
Acidity	0	0	0	.....	0	60.0	.....	.....	.....	.....	0	2.00	.....	.....	.....	.....	0	0

Table 52—Comparison of soils—Continued.

	Cotton, 1912.				Cotton, 1913.													
	C. B. Holmes, Trinity Co., Experiment 387		J. M. Henry, Wilson Co., Experiment 389		Willis Taylor, Anderson Co., Experiment 390		L. O. Meadows, Bowie Co., Experiment 391		C. E. Carter, Cass Co., Experiment 393		W. B. Hollingshead, Camp Co., Experiment 394		J. A. Hirst, Comanche Co., Experiment 395		A. S. Vankirk, Fannin Co., Experiment 399		N. O. Draper, Freestone Co., Experiment 400	
	Surface 4370	Subsoil 4371	Surface 7231	Subsoil 7232	Surface 7706	Subsoil 7707	Surface 7619	Subsoil 7620	Surface 7167	Subsoil 7168	Surface 7169	Subsoil 7170	Surface 7241	Subsoil 7242	Surface 7229	Subsoil 7230	Surface 7256	Subsoil 7257
Per cent;—																		
Phosphoric acid	.01	.03	.01	.04	.03	.04	.04	.02	.07	.04	.06	.03	.06	.02	.03	.04	.03	.04
Nitrogen	.04	.04	.03	.02	.04	.03	.06	.03	.04	.03	.06	.04	.08	.02	.09	.09	.04	.03
Potash	.07	.04	.09	.10	.05	.05	.08	.06	.04	.06	.07	.06	.09	.11	.14	.20	.14	.20
Lime	.29	.09	.52	.17	.40	.31	.71	.25	.16	.07	.29	.21	.17	.22	.29	.39	.33	.17
Magnesia	.12	.18	.11	.13	.08	.08	.10	.06	.06	.10	.06	.05	.10	.11	.10	.14	.06	.07
Alumina and oxide of iron	1.51	2.62	1.28	1.75	.70	7.5	1.27	2.52	.77	1.33	1.34	1.33	1.27	.87	5.06	7.88	2.08	3.01
Insoluble and soluble silica	94.28	94.37	96.63	96.28	97.26	97.79	96.01	95.55	96.82	97.55	95.54	96.76	96.99	97.74	88.59	83.37	95.83	94.45
Loss on ignition	1.54	1.69	.99	1.05	1.06	.67	1.37	1.04	1.55	.65	2.01	.88	1.03	.63	3.64	3.98	.....	2.04
Moisture	.57	.59	.31	.29	.14	.15	.39	.41	.21	.14	.55	.18	.29	.17	1.58	3.10	.....	.43
Parts Per Million;—																		
Active phosphoric acid	10.6	7.5	27.5	8.1	104.6	38.7	20.3	15.6	263.7	91.2	44.7	13.8	32.9	8.7	2.74	10.9	24.3	41.9
Active potash	68.7	66.2	147.5	122.5	99.1	83.7	98.7	103.7	126.2	75.0	153.1	75.0	133.1	45.0	89.3	56.2	143.1	82.5
Acidity	300	300	0	0	.....	.....	.....	.....	0	0	.....	23.0	0	200	0	0	0	0

Table 52—Comparison of soils—Continued.

	Cotton, 1913.														Cotton, 1914.			
	H. F. Arnecke, Goliad Co., Experiment 401		J. J. Cade, Milam Co., Experiment 405		J. A. Patterson, Runnels Co., Experiment 407		A. H. Anderson, Travis Co., Experiment 408		J. C. Lambertson, Victoria Co., Experiment 409		A. B. Binney, Walker Co., Experiment 411		L. C. Lehman, Washington County, Experiment 412		W. J. Manton, Clay Co., Experiment 417		Roger Davis, Franklin Co., Experiment 422	
	Surface 7175	Subsoil 7176	Surface 7120	Subsoil 7121	Surface 7355	Subsoil 7356	Surface 7145	Subsoil 7146	Surface 7091	Subsoil 7092	Surface 7252	Subsoil 7253	Surface 7339	Subsoil 7340	Surface 9380	Subsoil 9381	Surface 9183	Subsoil 9184
Per Cent;—																		
Phosphoric acid	.05	.03	.02	.07	.08	.06	.07	.06	.04	.02	.02	.09	.03	.03	.05	.05	.03	.04
Nitrogen	.06	.06	.11	.08	.16	.14	.10	.07	.03	.03	.03	.02	.09	.07	.07	.08	.04	.05
Potash	.07	.28	.15	.31	.84	.83	.55	.56	.25	.06	.06	.07	.11	.16	.18	.40	.11	.26
Lime	.31	.59	.32	.51	.86	1.13	16.39	17.10	.17	.10	.10	.26	.60	.69	.14	.18	.15	09
Magnesia	.06	.36	.20	.22	.31	.19	1.15	.47	.11	.11	.11	.17	.18	.26	.13	.26	.12	.17
Alumina and oxide of iron	2.00	12.42	5.13	10.33	7.92	8.28	8.78	10.92	.88	.64	.64	.68	7.50	9.08	3.51	8.21	1.83	8.38
Insoluble and soluble silica	94.66	76.52	88.90	80.67	78 5	79.29	47.11	44.69	97.58	98.28	98.28	98.41	83.58	80.95	91.98	86.04	95.00	84.91
Loss on ignition	2.04	4.75	2.90	4.12	5.51	5.29	8.23	9.76	.84	.67	.67	.38	4.88	4.48	.....	.....	1.66	3.32
Moisture	.64	4.79	1.93	4.19	3.10	3.08	6.79	5.96	.28	.09	.09	.09	3.06	4.18	.....	.....	.27	16.7
Parts Per Million;—																		
Active phosphoric acid	245 6	7.5	9.0	6.8	191.9	156.2	14.4	7.5	16.8	48.3	48.3	21.8	18.2	11.2	35.3	4.7	14.1	5.6
Active potash	80.6	67.5	109.3	108.7	931.2	829.25	135.0	30.0	121.2	77.8	77.8	31.2	113.7	81.2	261.3	407.5	113.8	101.2
Acidity	0	.....	0	.....	.....	.....	.....	.....	0	0	0	.....	.....	0	.....	0	0	0

Table 52—Comparison of soils—Continued.

	Cotton, 1914.																	
	Allen Bell, Henderson Co., Experiment 428		F. M. Goodell, Henderson Co., Experiment 429		W. D. Phillips, Jasper Co., Experiment 434		A. W. West, Jasper Co., Experiment 435		J. B. Webb, Lubbock Co., Experiment 438		Joseph Watson, Nueces Co., Experiment 440		J. R. Nalley, Robertson Co., Experiment 443		O. J. Berry, Rusk Co., Experiment 445		J. W. Malone, Smith Co., Experiment 450	
	Surface 9271	Subsoil 9272	Surface 9179	Subsoil 9180	Surface 9376	Subsoil 9377	Surface 9165	Subsoil 9166	Surface 9297	Subsoil 9298	Surface 9279	Subsoil 9280	Surface 9040	Subsoil 9041	Surface 9285	Subsoil 9286	Surface 9283	Subsoil 9284
Per cent;—																		
Phosphoric acid	.05	.03	.04	.03	.04	.04	.03	.02	.06	.07	.03	.02	.03	.02	.03	.03	.10	.12
Nitrogen	.03	.02	.05	.04	.04	.04	.05	.02	.07	.09	.03	.04	.04	.02	.03	.02	.03	.04
Potash	.05	.08	.10	.22	.05	.10	.02	.04	.57	.96	.05	.05	.05	.09	.03	.07	.01	.16
Lime	.06	.08	.22	.04	.26	.13	.06	.02	.43	4.13	.17	.24	.19	.27	.35	.07	.11	.09
Magnesia	.10	.12	.09	.12	.09	.09	.09	.08	.47	.38	.07	.07	.12	.10	.03	.07	.07	.09
Alumina and oxide of iron	.73	.73	2.66	8.66	1.68	4.72	1.29	1.60	8.41	11.55	.70	.91	.77	.74	1.03	2.08	13.82	20.47
Insoluble and soluble silica	97.37	98.02	94.00	85.26	94.86	94.79	94.97	96.52	84.31	68.99	98.08	97.86	97.47	98.15	97.52	96.50	82.28	72.35
Loss on ignition	.....	.....	1.89	2.96	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.87	.93	.....	.....
Moisture	.....	.....	1.64	1.76	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.17	.33	.....	.....
Parts Per Million;—																		
Active phosphoric acid	15.0	6.8	11.9	3.1	46.3	7.5	51.8	11.8	25.0	157.0	15.6	26.2	36.9	10.6	13.4	10.6	10.0	8.7
Active potash	80.0	60.0	87.5	63.7	105.0	137.5	37.5	30.0	407.5	457.5	102.5	70.0	95.6	91.2	60.0	70.0	107.5	87.5
Acidity	0	0	0	700	0	0	700	460	0	0	0	0	0	0	0	2.30	0	0

Table 52—Comparison of soils—Continued.

	Cotton, 1914.				Cotton 1915.													
	J. M. Auders, Van Zandt Co., Experiment 454		W. J. Gardner, Van Zandt Co., Experiment 455		Frank Buskemper, Austin Co., Experiment 459		Frank Koster, Colorado Co., Experiment 460		J. W. Bell, Henderson Co., Experiment 461		J. S. Kimbler, Hunt Co., Experiment 462		C. M. Thompson, Mitchell Co., Experiment 463		H. L. Lovett, San Jacinto Co., Experiment 467		John Kelly, Smith Co., Experiment 468	
	Surface 9171	Subsoil 9172	Surface 9309	Subsoil 9310	Surface 11420	Subsoil 11421	Surface 11245	Subsoil 11246	Surface 11253	Subsoil 11254	Surface 11418	Subsoil 11419	Surface 11264	Subsoil 11265	Surface 11310	Subsoil 11311	Surface 11262	Subsoil 11263
Per Cent;—																		
Phosphoric acid	.03	.04	.04	.03	.03	.09	.04	.03	.03	.02	.03	.03	.04	.05	.021	.03	.03	.02
Nitrogen	.03	.03	.03	.02	.04	.04	.07	.08	.04	.02	.09	.06	.06	.04	.03	.02	.02	.01
Potash	.04	.04	.06	.05	.07	.12	.17	.31	.10	.09	.18	.26	.32	.40	.02	.03	.05	.07
Lime	.06	.05	.10	.09	.11	.20	.59	.68	.55	.16	.31	.63	.13	.15	.10	.10	.10	.15
Magnesia	.10	.11	.09	.09	.20	.24	.27	.32	.14	.02	.30	.60	.22	.22	.07	.10	.22	.19
Alumina and oxide of iron	.95	3.96	1.60	1.66	1.82	4 95	4.05	9.85	1.38	1.80	7.66	12.38	4.45	6.10	1.19	2.70	.78	.73
Insoluble and soluble silica	97.74	93.34	96.85	97.13	95.66	90.90	89.33	79.60	95.98	96.66	82.21	73.98	90.77	81.51	96.94	96.06	97.80	98.09
Loss on ignition	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Moisture	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Parts Per Million;—																		
Active phosphoric acid	22.5	13.7	16.3	8.7	28.7	5.0	28.4	8.0	11.9	11.3	10.6	7.5	33.1	18.8	13.8	8.8	86.3	29.9
Active potash	67.5	46.2	90.6	75.0	117.5	116.2	186.2	108.8	14.0	91.2	83.1	9.0	288.7	298.7	46.2	25.0	53.7	48.7
Acidity	0	0	0	0	0	0	0	0	0	0	700	0	.....	0	0	230	0	0

Table 52—Comparison of soils—Continued.

	Cotton, 1916.								Corn, 1915.									
	Y. B. Reed, Fannin Co., Experiment 472		Howeth Allen, Fannin Co., Experiment 473		L. T. Manning, Jack Co., Experiment 474		W. H. Wedemeyer, Washington Co.		W. O. Berry, Angelina Co., Experiment 481		Albert Williams, Burnet Co., Experiment 483		H. T. Redwine, Comanche Co., Experiment 484		W. T. Lawrence, Coryell Co., Experiment 485		V. B. Smith, Donley Co., Experiment 487	
	Surface 12982	Subsoil 12983	Surface 12963	Subsoil 12964	Surface 13186	Subsoil 13187	Surface 12984	Subsoil 12985	Surface 12974	Subsoil 12975	Surface 11375	Subsoil 11376	Surface 11392	Subsoil 11393	Surface 11416	Subsoil 11417	Surface 11285	Subsoil 11286
Per cent;—																		
Phosphoric acid	.....	.....	.11	.11	.03	.....	.....	.....	.....	.08	.19	.12	.06	.05	.03	.04	.06	.04
Nitrogen	.06	.042	.16	.15	.076	.059	.043	.058	.16	.....	.16	.08	.11	.11	.02	.03	.06	.05
Potash	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.80	.68	.52	.67	.09	.34	.32	.24
Lime	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	16.22	19.75	2.45	1.20	.12	.17	.27	.27
Magnesia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.39	.65	.33	.22	.26	.26	.22	.23
Alumina and oxide of iron	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9.14	7.60	6.58	8.43	.78	5.63	4.83	3.88
Insoluble and soluble silica	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	52.42	49.77	81.16	79.73	96.26	89.59	89.96	91.57
Loss on ignition	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11.36	10.46	.....	.....	.....	.....	.....	.....
Moisture	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.05	2.83	.....	.....	.....	.....	.....	.....
Parts Per Million;—																		
Active phosphoric acid	32.5	56.2	52.5	58.1	.....	.....	238.1	17.5	.13	5.0	162.8	74.9	71.2	31.2	16.2	4.4	122.2	92.5
Active potash	14.4	27.3	391.2	261.2	.....	.....	.....	.....	.....	.....	366.2	155.0	577.5	515.0	103.7	191.2	330.0	417.5
Acidity	0	0	0	0	0	0	0	0	460	.....	.....	.....	.....	.....	0	0	230	110.0

Table 52—Comparison of soils—Continued.

	Corn, 1915.																	
	Wm. C. Frochner, Gonzales Co., Experiment 490		W. A. Ray, Gregg Co., Experiment 492		A. G. Smith, Jack Co., Experiment 495		J. H. Christopher, Matagorda Co., Experiment 497		F. A. Scott, Mills Co., Experiment 498		J. L. Cochran, Rusk Co., Experiment 502		J. M. Ashley, Rusk Co., Experiment 503		R. E. Loenard, Wise Co., Experiment 507		L. C. Samson, Wise, Co., Experiment 508	
	Surface 11388	Subsoil 11389	Surface 11247	Subsoil	Surface 11337	Subsoil 11338	Surface 11304	Subsoil 11305	Surface 11394	Subsoil 11395	Surface 11266	Subsoil 11267	Surface 9932	Subsoil 9933	Surface 9690	Subsoil 9691	Surface 11306	Subsoil 11307
Per Cent;—																		
Phosphoric acid	.04	.05	.07	.....	.03	.04	.03	.02	.09	.08	.02	.03	.058	.056	.128	.10	.11	.03
Nitrogen	.09	.08	.12	.....	.....	.....	.08	.07	.22	.18	.03	.03	.065	.038	.190	.15	.19	.16
Potash	.19	.32	.09	.....	.33	.76	.16	.42	.80	.57	.08	.09	.06	.09	.....	.....	.88	.78
Lime	.42	.....	.17	.....	.20	.26	.24	.30	.....	144.7	.16	.09	.21	.18	.....	.....	4.24	6.82
Magnesia	.19	.....	.27	.....	.15	.34	.21	.47	.....	.48	.24	.11	.09	.10	.....	.....	.67	.85
Alumina and oxide of iron	8.25	.....	3.04	.....	5.45	12.08	4.48	9.78	.....	12.10	1.62	.....	3.21	6.59	.....	.....	15.59	15.35
Insoluble and soluble silica	81.27	.....	90.99	.....	90.70	80.21	86.76	74.49	.....	.....	95.86	89.97	94.86	90.74	.....	.....	60.31	57.03
Loss on ignition	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	2.03	.....	.....	.....	.....
Moisture	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.33	.67	.....	.....	.....	.....
Parts Per Million;—																		
Active phosphoric acid	11.0	7.0	40.9	.....	11.6	20.4	38.4	4.6	155.0	10.5	18.8	8.8	19.4	3.7	48.2	20.6	141.9	26.9
Active potash	21.75	122.5	158.7	.....	203.7	197.5	38.4	45.0	603.7	131.9	46.2	45.0	12.9	106.2	196.5	66.2	360.0	135.0
Acidity	0	0	0	.....	.....	.....	230	.....	0	0	0	230	460	0	0	0	.....	.....

Table 52—Comparison of soils—Continued.

	Corn, 1915.		Corn, 1916.								Irish Potatoes, 1911.							
	S. A. King, Wood Co., Experiment 509		Dr. Geo. M. Hiler, Colorado Co., Experiment 512		J. J. Hair, Henderson Co., Experiment 514		Robt. D. Halsell, Palo Pinto Co., Experiment 515		M. Sloan, Walker Co., Experiment 516		J. T. Mallard, Falls Co., Experiment 540		C. H. Cloud, Henderson Co., Experiment 542		J. H. Murphy, Hopkins Co., Experiment 543		William Lade, Anderson Co., Experimen 546	
	Surface 11251	Subsoil 11252	Surface 12988	Subsoil 12989	Surface 12959	Subsoil 12960	Surface 12961	Subsoil 12962	Surface 13184	Subsoil 13185	Surface 5100	Subsoil 5101	Surface 5098	Subsoil 5099	Surface 5959	Subsoil 5960	Surface 5945	Subsoil 5946
Per cent;—																		
Phosphoric acid	.02	.02	.....	.....	.....	.....	.....	.....	.03	.02	.02	.02	.03	.007	.08	.09	.04	.04
Nitrogen	.04	.02	.05	.04	.03	.02	.09	.07	.05	.02	.02	.01	.05	.02	.09	.09	.03	.03
Potash	.07	.11	.....	.....	.....	.....	.....	.....	.....	.....	.09	.06	.08	.06	.47	.48	.06	.03
Lime	.65	.09	.....	.....	.....	.....	.....	.....	.....	.....	.21	.06	.12	.28	.57	.72	.09	.05
Magnesia	.11	.06	.....	.....	.....	.....	.....	.....	.....	.....	.21	.15	.20	.19	.31	.33	.11	.08
Alumina and oxide of iron	1.21	2.41	.....	.....	.....	.....	.....	.....	.....	.....	.90	.48	1.10	.94	8.39	11.56	71.68	.71
Insoluble and soluble silica	96.31	95.75	.....	.....	.....	.....	.....	.....	.....	.....	97.13	98.75	96.23	97.15	82.74	76.96	97.83	98.07
Loss on ignition	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.86	.32	1.60	.82	3.89	5.14	0.77	0.58
Moisture	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.25	.07	.34	.30	3.18	4.51	0.15	0.11
Parts Per Million;—																		
Active phosphoric acid	28.3	6.2	13.8	6.9	61.2	30.0	31.2	12.5	28.1	.....	60.6	10.6	36.3	14.4	200.6	146.8	48.7	56.2
Active potash	95.0	90.0	.....	.....	115.0	86.2	278.7	236.2	.....	.....	178.7	.....	157.5	83.7	25.0	242.5	83.7	140.0
Acidity	0	0	460	230	0	0	0	0	0	0	0	.5	0	.....	0	0	0	0

Table 52—Comparison of soils—Continued.

	Irish potatoes, 1912				Irish potatoes, 1913												1914	
	G. K. Cannon, Bexar Co., Experiment 548		F. P. Dunkle, Donley Co., Experiment 550		G. M. Thomas, Bastrop Co., Experiment 555		J. P. Blackwell, Bastrop Co., Experiment 556		C. W. Stone, Cass Co., Experiment 558		A. Ryall, Jasper Co., Experiment 561		Frank Svack, Waller Co., Experiment 564		L. L. Moore, Wharton Co., Experiment 565		W. D. Crump, Lubbock Co. Experiment 567	
	Surface 4310	Subsoil 4311	Surface 7102	Subsoil 7103	Surface 7129	Subsoil 7130	Surface 7254	Subsoil 7255	Surface 7149	Subsoil 7150	Surface 7225	Subsoil 7226	Surface 7237	Subsoil 7238	Surface 7157	Subsoil 7158	Surface 9382	Subsoil 9383
Per Cent;—																		
Phosphoric acid	.02	.01	.06	.06	.03	.06	.02	.05	.05	.01	.04	.05	.04	.03	.08	.11	.06	.06
Nitrogen	.03	.02	.09	.06	.08	.07	.05	.05	.29	.035	.03	.06	.11	.05	.05	.07	.09	.07
Potash	.14	.15	.32	0.42	.12	.19	.10	.18	.06	.08	.09	.03	.11	.14	.42	.58	.55	68
Lime	.22	.28	.34	.43	.11	.11	.60	.16	.13	.70	.15	.41	.27	.35	8.66	9.81	.44	.68
Magnesia	.11	.10	.16	.13	.13	.16	.11	.07	.06	.06	.08	.06	.09	.06	.22	1 36	.16	.15
Alumina and oxide of iron	1.36	1.44	3.90	4 44	3 57	5.50	1.43	4.48	1.64	3.53	3 29	1.45	2.71	5.00	5 16	7 18	6 80	8.35
Insoluble and soluble silica	96 43	96.44	90.26	90 55	91 69	90 45	96 15	92.12	96.14	94.17	94 31	96.23	92 46	89 88	73 87	67 23	82.84	80.45
Loss on ignition	1.23	.99	3.89	2.30	2.26	2.08	1.32	1.65	1.06	1.34	1.38	1.35	2.91	2 34	4 61	5 40	.....	.....
Moisture	.35	.38	1.45	1.43	1.17	1.16	.37	.98	.19	.31	.33	.28	1.01	1.93	1.31	3.25	.....	.....
Parts Per Million;—																		
Active phosphoric acid	15.6	6.8	142.1	66.8	16.8	7.5	17.2	6.9	2.56	11.5	49.6	101.2	18.7	7.4	82.1	29.4	107.8	83.7
Active potash	206.2	154.2	389.4	272.5	2.65	112.5	146.2	116.2	76.2	46.2	126.2	112.5	73.7	65.6	82.5	42.5	561.3	517.5
Acidity	0	0	0	0	216	464	0	0	0	0	0	0	acid 200	acid				

Table 52—Comparison of soils—Continued.

	Irish Potatoes, 1911		1911				1912		Sweet Potatoes, 1913								1914
	W. S. Lawrence, Galveston Co., Experiment 571		Philip Endler, Brazos Co., Experiment 576		Lee Barnet, Wilbarger Co., Experiment 583		J. A. Phillips, Gregg Co., Experiment 585		R. O. Carnes, Callahan Co., Experiment 586			S. L. Bryant, Freestone Co., Experiment 587		J. R. Walker, Lamar Co., Experiment 588		E. H. Watson, Polk Co., Experiment 589		S. C. Folson, Coryell Co., Experiment 594
	Surface 13728	Subsoil 13729	Surface 5937	Subsoil 5938	Surface 4603	Subsoil 4604	Surface 7114	Subsoil 7115	Surface 7131	Surface 7132	Subsoil 7133	Surface 7250	Subsoil 7152	Surface 7173	Subsoil 7174	Surface 7163	Subsoil 7164	Surface 11396
Per cent;—																		
Phosphoric acid	.....	.....	.....	.....	.05	.04	.02	.....	.03	.04	.05	.04	.03	.02	.04	.04	.04	.08
Nitrogen	.09	.06	.05	.031	.047	.04	.04	.021	.03	.05	.03	.05	.04	.03	.06	.04	.04	.14
Potash	.....	.....	.12	0.15	.36	.40	.058	.09	.125	.05	.05	.....	.14	.07	.17	.08	.07	.47
Lime	.....	.....	.12	.35	.25	.50	.22	.07	.36	.23	.20	.11	.15	.12	.13	.31	.28	10.74
Magnesia	.....	.....	.11	.30	.31	.39	.05	.09	.07	.24	.16	.11	.12	.07	.10	.07	.09	.34
Alumina and oxide of iron	.....	.....	1.46	7.63	4.11	5.07	.91	3.45	.98	7.89	1.57	2.91	3.58	1.02	5.05	2.01	2.51	6.76
Insoluble and soluble silica	.....	.....	96.44	86.04	92.04	89.13	97.73	94.23	96.73	82.38	96.39	94.58	92.79	97.47	91.08	94.94	94.15	64.96
Loss on ignition	.....	.....	1.44	2.55	1.78	2.26	.66	.94	1.08	2.63	.71	1.59	1.86	.73	1.73	1.43	1.19	.....
Moisture	.....	.....	.47	2.99	1.13	1.76	.15	.19	.44	4.14	.71	.54	.71	.20	1.26	.66	.91	.....
Parts Per Million;—																		
Active phosphoric acid	12 5	6 2	34.4	17.5	17.0	.85	23.1	21.8	.51	1.25	43.7	16.8	6.2	23 1	7.5	42.1	25.0	30.6
Active potash	103.7	106.2	120.0	87.5	36.0	267.5	161.2	125	143	226	115	96.2	41.2	115.0	76.2	151.0	103.7	173.7
Acidity	.....	.....	.....	0	0	0	0	0	0	464	0	0	0	0	690	.....	0	0

SUMMARY AND CONCLUSIONS.

1. This bulletin discusses the results of 389 cooperative fertilizer experiments made from 1907 to 1917. There were 151 experiments with cotton, 153 with corn, 54 with Irish potatoes, 23 with sweet potatoes, and 8 miscellaneous.

2. With cotton seventy-five per cent. of the experiments gave a gain with acid phosphate, sixty-eight per cent. a gain with cottonseed meal, and only fifty-three per cent. gave a gain with potash.

3. From 150 to 200 pounds of acid phosphate produced an average gain of from 50 to 185 pounds seed cotton per acre, where a gain occurred.

4. from 30 to 100 pounds of cottonseed meal produced an average gain of from 20 to 105 pounds seed cotton, where a gain occurred.

5. From five to twenty-five pounds muriate of potash produced gains of 20 to 140 pounds seed cotton, where a gain occurred.

6. Acid phosphate is the most certain and the most profitable fertilizer for cotton and corn, but if used exclusively without legumes turned under, or additions of barnyard manure, the soil will become depleted in nitrogen.

7. A fertilizer composed of equal parts acid phosphate and cottonseed meal, or one containing about eight per cent. available phosphoric acid and three and one-half per cent. nitrogen at the rate of 150 to 200 pounds per acre seems to be about the best mixed fertilizer for general use on cotton or corn in Texas.

8. If larger quantities of fertilizer are to be used on cotton, the percentage of nitrogen should be increased and that of phosphoric acid decreased in order not to supply an excess of phosphoric acid. We would suggest a fertilizer containing about five per cent. phosphoric acid and four per cent. nitrogen be employed, if 300 pounds or more are to be used on cotton.

9. The general use of potash in mixed fertilizers on cotton or corn in Texas is not profitable, and we advise that potash *not* be used unless it is certainly known to be needed.

10. Where potash is certainly needed we would suggest that fertilizer containing about eight per cent. available phosphoric acid, not less than three per cent. nitrogen, and not less than three per cent. potash be used in case the application is to be 150 or 200 pounds per acre for cotton or corn. If the application is to be larger than 200 pounds per acre, the percentage of available phosphoric acid should be decreased, and the percentage of nitrogen and potash increased.

11. Barnyard manure gave average gains of 107 to 227 pounds seed cotton per acre. Good gains of corn were also secured. The effects of the manure lasts several years.

12. As an average of sixteen experiments, the phosphoric acid of rock phosphate was found to have about twenty-two per cent. of the effect on cotton of available phosphoric acid in acid phosphate.

13. Hydrated lime in twenty experiments gave an average decrease on cotton of about six per cent.

14. Where one-half of cottonseed meal was replaced by an equivalent amount of nitrate of soda the results on cotton were slightly lower than for nitrate of soda alone.

15. Of the fifty-four experiments with Irish potatoes, seventy-two per cent. gave results with acid phosphate, eighty-seven per cent. gave results with cottonseed meal, and fifty-two per cent. gave results with potash.

16. Acid phosphate, 300 pounds, produced an average gain of from ten to twenty-four bushels per acre of Irish potatoes, where a gain occurs; 400 pounds of cottonseed meal alone produced an average gain of from eighteen to twenty-eight bushels; twenty pounds of sulphate or muriate of potash produced from six to ten bushels per acre, where a gain occurs. Smaller applications of fertilizer should be sufficient to produce the above results.

17. A mixture of 100 pounds of acid phosphate with 200 pounds cottonseed meal seems to be the best average fertilizer for Irish potatoes or sweet potatoes or a mixed fertilizer containing about five per cent. available phosphoric acid and forty-five per cent. nitrogen, at the rate of 200 to 300 pounds per acre, is suggested. Larger applications may be used where the crop possibility is greater.

18. Potash should be used only when the soil is probably deficient in potash. In such case a mixture of 100 pounds acid phosphate, 200 pounds cottonseed meal, and twenty pounds muriate or sulphate of potash appears to be the best all around fertilizer for Irish potatoes or sweet potatoes under Texas conditions, or a mixed fertilizer containing about five per cent. available phosphoric acid, four and one-half per cent. nitrogen, and three per cent. potash. On some types of soil more potash may be needed. The fertilizer may be applied at the rate of from 200 to 300 pounds per acre.

19. Twenty loads of manure per acre produced an average gain of three and nine-tenths to four and one-half bushels per acre the first two years, and from thirty-one to thirty-eight bushels per acre the last four years, in Irish potatoes.

20. In the tests in which half the cottonseed meal was replaced by an equivalent amount of muriate of soda, the results were practically the same as where cottonseed meal only was used.

21. In twenty-three tests with sweet potatoes, sixty-five per cent. showed gains with acid phosphate and cottonseed meal and fifty-six per cent. showed gains with potash.

22. Where a gain occurs, the average gain for sweet potatoes with 300 pounds of acid phosphate was from nineteen to seventy-one bushels per acre; for 400 pounds cottonseed meal it was eight to forty-seven bushels; for forty pounds muriate of potash it was from fifteen to sixty bushels. Smaller applications of fertilizer should be sufficient to produce the above results.

23. Analyses are given of a number of the soils in which the tests were made. A discussion of the relation of the field experiments, pot experiments and soil composition, is reserved for a later bulletin.